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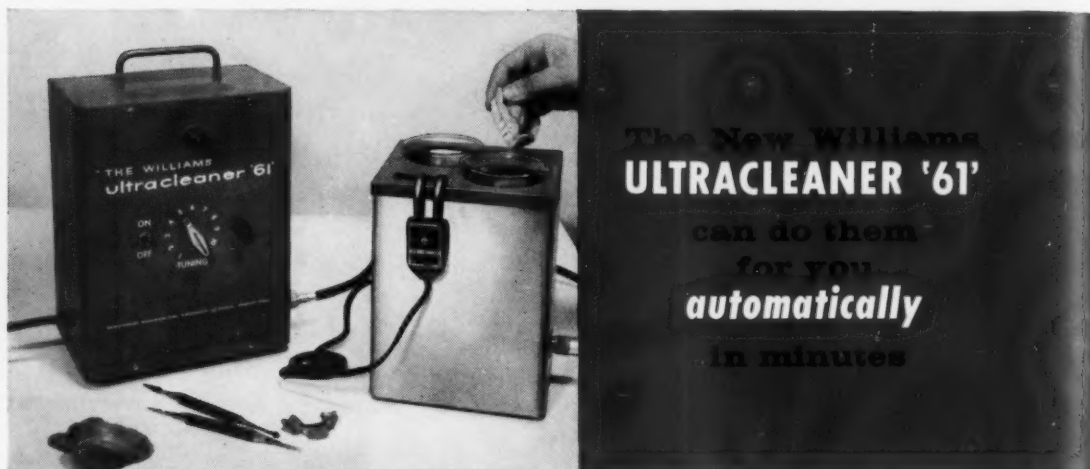
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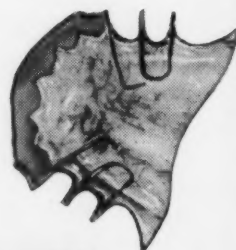
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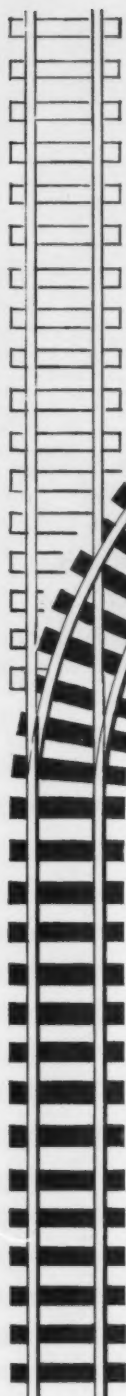
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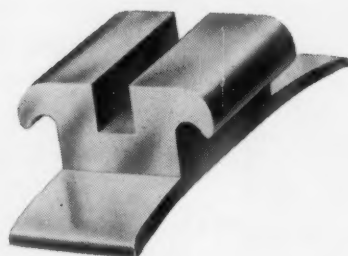
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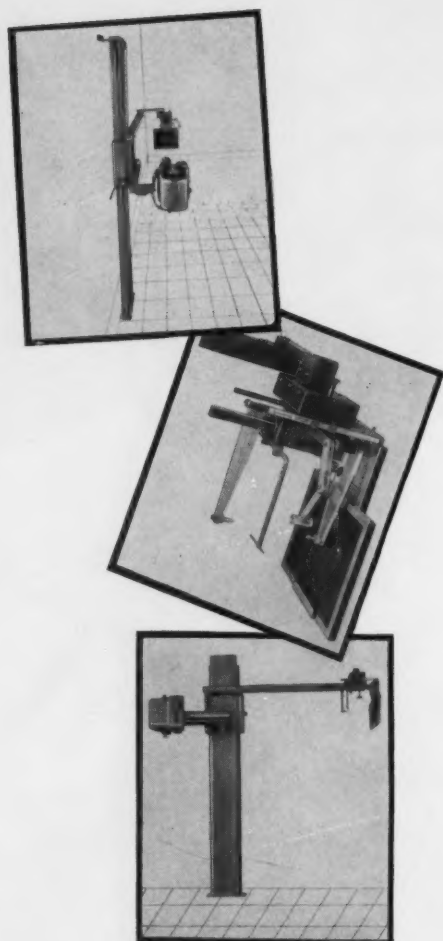


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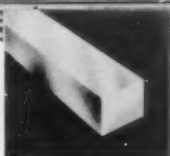


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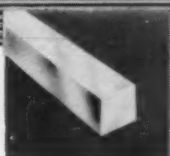
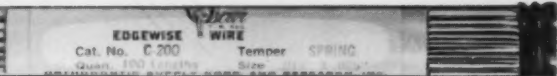
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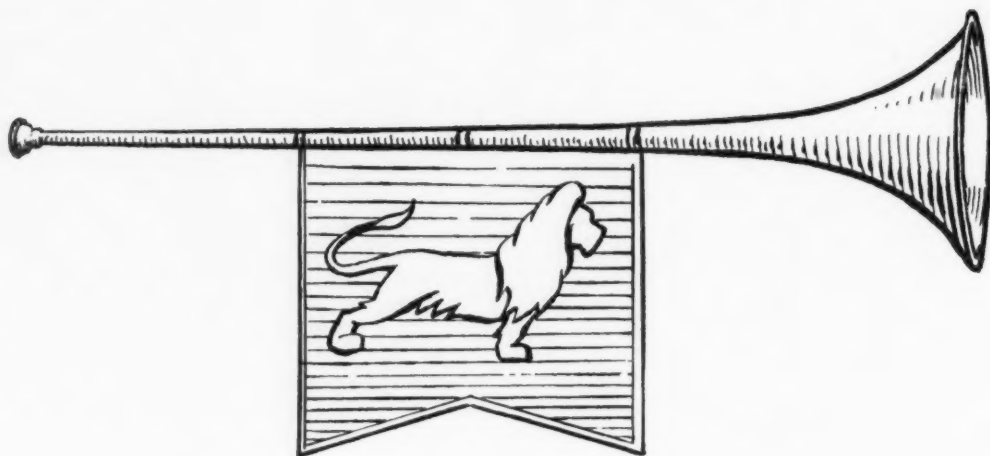
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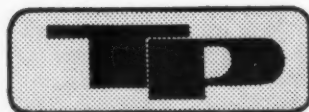


To a degree seldom matched in history, medieval Europe was marked by pomp and pagentry. Persons of noble birth made a constant display of their wealth and power. They not only rode in fine carriages and wore expensive clothing; they were constantly surrounded by a corps of servants and guards. When such a party rode into a town, it was necessary to clear the narrow streets so that they could pass. So heralds always led the group and blew their horns to announce the coming of a person of importance.

Vendors and street salesmen also used horns to attract a crowd of patrons. Having no servants to do it for them, such fellows were forced to blow their own horns. Their merchandise seldom proved worth the fanfare, so to blow one's own horn came to stand for any sort of boasting or vulgar display.*

Naturally, we don't try to blow our own horn. We rely on our satisfied Positioner customers to do it for us — sometimes the noise is deafening.

*Quoted from the book "Why You Say It" by Webb B. Garrison, with the kind permission of the author and the publisher, Abingdon Press.



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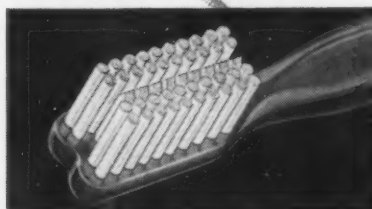
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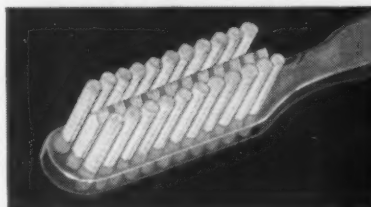
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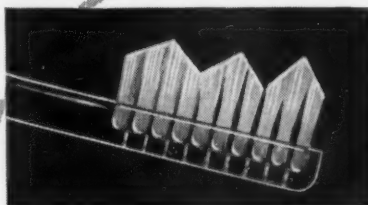


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THE PARADOX OF ORAL CANCER

In 1961, some 13,300 cases of oral cancer will be diagnosed. Of these, only 5,000 will be cured! It is a tragic paradox that the cure rate should be so low for a cancer that is accessible and comparatively easy to detect in its early and curable stages.

Since the patient himself is often not alerted to oral cancer by pain or even by a danger signal, the dentist's responsibility is crucial. In his routine examinations of the patient's oral cavity, he has the opportunity to recognize asymptomatic lesions that may be early, curable cancer.

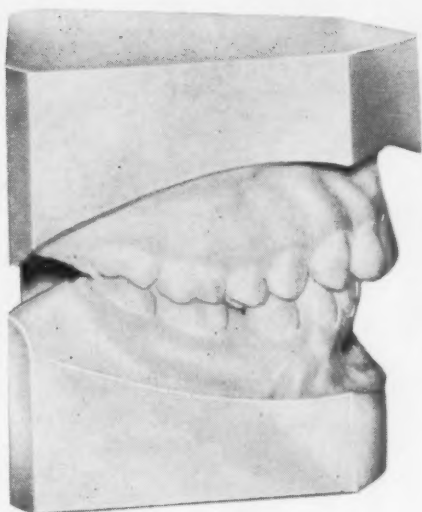
More and more patients are having periodic dental checkups. Their number must increase if oral cancer is to be better controlled. The American Cancer Society's public and professional educational efforts encourage earlier case findings by stressing the importance of regular health checkups and professional consultations when symptoms develop. Implementing these efforts are films, publications, exhibits, speakers. Information may be obtained at local units of the

AMERICAN CANCER SOCIETY



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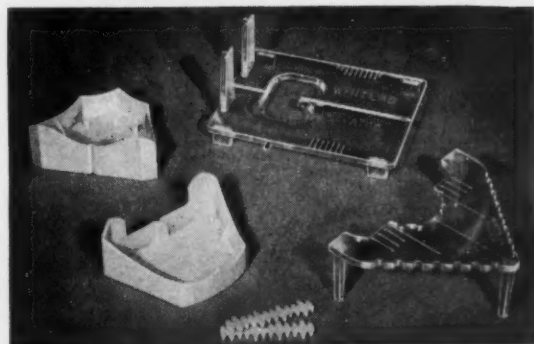
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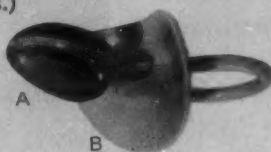
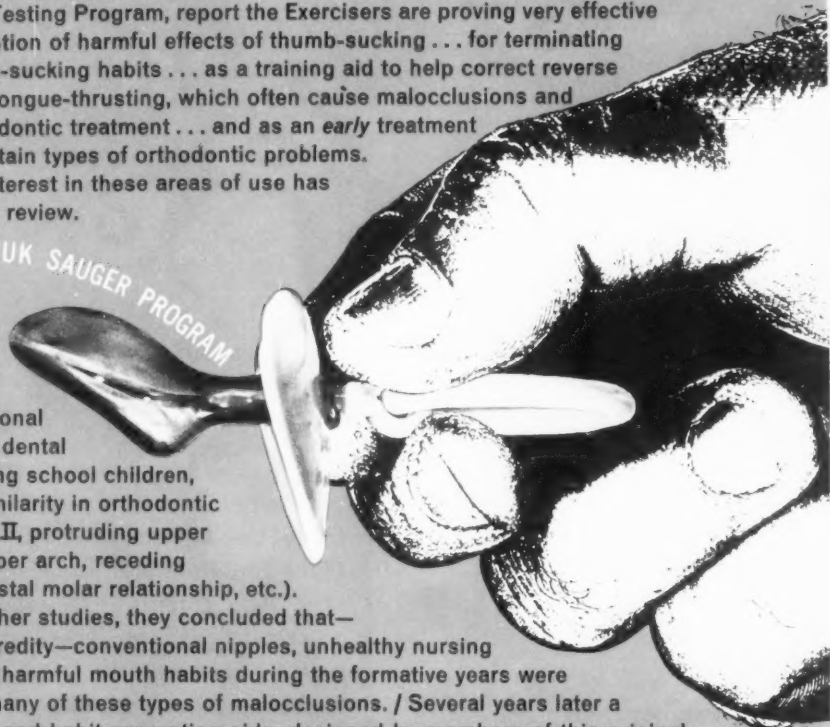
special report on... **sauger**
exercisers

A number of orthodontists, pedodontists, and speech pathologists, working with the Nuk Sauger Testing Program, report the Exercisers are proving very effective . . . for the prevention of harmful effects of thumb-sucking . . . for terminating prolonged thumb-sucking habits . . . as a training aid to help correct reverse swallowing and tongue-thrusting, which often cause malocclusions and complicate orthodontic treatment . . . and as an *early* treatment appliance for certain types of orthodontic problems. The increased interest in these areas of use has necessitated this review.

EVOLUTION OF THE NUK SAUGER PROGRAM

About 15 years ago a group of German professional people, studying dental deformities among school children, noted a great similarity in orthodontic problems (Class II, protruding upper teeth, narrow upper arch, receding mandible with distal molar relationship, etc.).

As a result of other studies, they concluded that—in addition to heredity—conventional nipples, unhealthy nursing procedures, and harmful mouth habits during the formative years were also causes of many of these types of malocclusions. / Several years later a variety of nipple and habit-preventing aids, designed by members of this original study group, began to be tested. After a series of re-evaluations and modifications, the orthodontic nipple and exercisers finally came into being. / As the pioneer and leading manufacturer of modern orthodontic specialties, Rocky Mountain was chosen to test these developments in the United States . . . to learn if they would be accepted, to determine refinements necessary for use in America, etc. (Note: Complete information on the nipple is given in our Product Research Bulletin on the Nuk Sauger Preventive Orthodontic Program and in listed professional articles. As information on the Exercisers is only sketchy in the literature, this report will deal only with the Exercisers.)

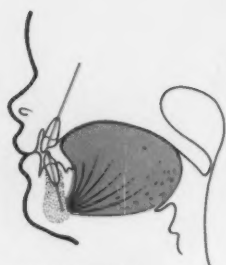


THEORY AND STRUCTURE OF THE ORTHODONTIC EXERCISERS

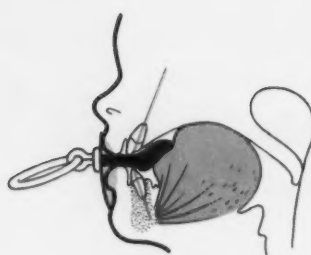
While sucking and mouthing should be accepted as natural and healthy phases of development during the first years, the bony structures of an infant are soft and easily misshapen by slight, continuous pressures of harmful swallowing and tongue habits, thumb- and finger-sucking, etc. The philosophy behind the orthodontic exercisers is to capitalize on the natural desire to suck, to effect prevention and, when feasible, early therapy. / The Exercisers are composed of two anatomically designed elements: the mouth shield and the exercising baglets.

A The exercising baglets are of soft latex. They are hollow and collapsible under slight pressure, so as to satisfy sucking and chewing desires, develop masticatory muscles and functions, gently massage mouth structures and generally guide oral development toward orthodontically healthy relationships.

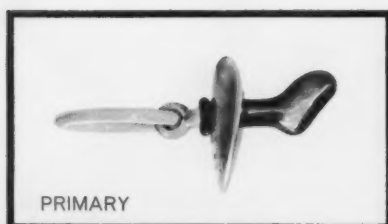
B The mouth shield conforms to basic anatomical facial norm. Besides serving as an "outer-balance" or "guide," it builds muscle tone of lips, which in turn helps prevent or correct narrowing and protrusion of the upper teeth and dental arch.



NORMAL SWALLOWING



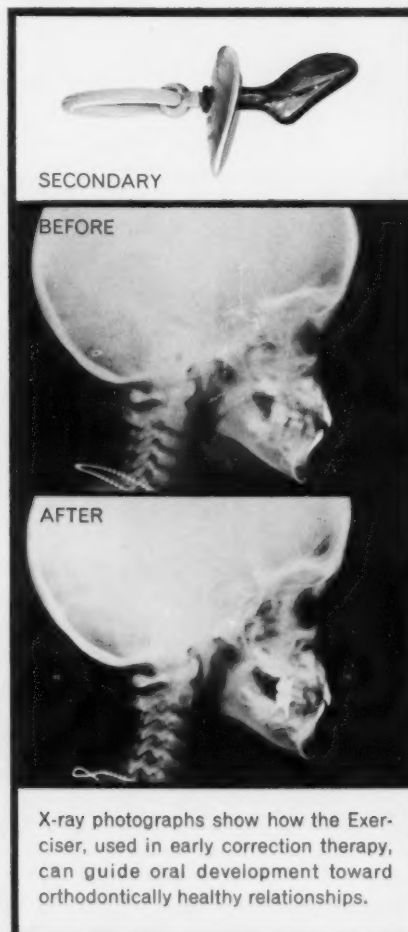
NUK SAUGER EXERCISER



PRIMARY

Of special importance is the fact that the anatomical form of the baglets "cups" the tongue in normal palatal relationship, thus guiding it to assume healthy swallowing and movement patterns. There are two Exercisers: the small Primary Exerciser, the larger Secondary Exerciser. / While the Primary Exerciser may on occasion be used to correct certain types of mouth breathing and to help some babies

develop healthier swallowing and tongue habits, it is primarily used as a thumb-, finger- or object-sucking substitute. / The Secondary Exerciser is larger. Although it may be used as a thumb substitute if the smaller exerciser loses its challenge, or if the dentist or physician recommends it because the initial thumb-sucking phase seems to be continuing too long, the Secondary Exerciser is usually used for therapy as follows. / **"terminating" thumb- and finger-sucking habits:** When a sucking habit is advanced or has been renewed, the Secondary Exerciser can help the child "control" or "master" the habit. The child and the parents are fully informed about thumb-sucking, about the nature of the habit—that it is a carry-over of a natural developmental phase—that the Exerciser is to offset bad effects of thumb-sucking—and to serve as a reminder to help the youngster master the habit. The child is instructed to use the Exerciser instead of the thumb, at night, when at home, and when convenient for him to do so without embarrassment. While results will not be positive all the time, those who prescribe this treatment say the majority of youngsters soon "forget" the habit. / **training aid to correct reverse swallowing:** It has been said that 21 muscles are used in split-second timing during a swallowing movement, that the tongue exerts about 6 pounds of pressure against the teeth during swallowing, and that the average person swallows about 2000 times a day. It follows, of course, that these movements can produce harmful effects if they are not in natural balance. / During normal swallowing the individual

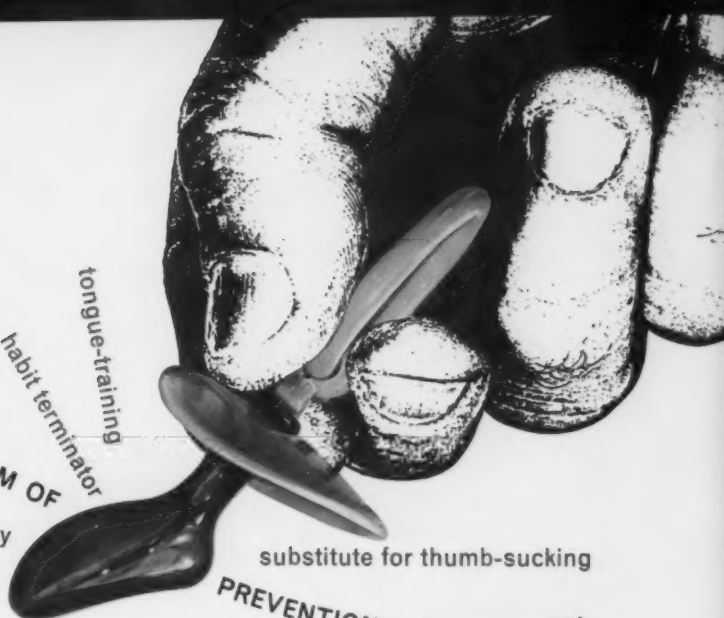


X-ray photographs show how the Exerciser, used in early correction therapy, can guide oral development toward orthodontically healthy relationships.



AN INTERESTING PROGRAM OF
early orthodontic therapy

tongue-training
habit terminator



substitute for thumb-sucking

PREVENTION AND THERAPY



THUMB-SUCKING



REVERSE SWALLOWING AND
TONGUE-THRUSTING

withdraws his tongue. Those who have acquired the abnormal habit of reverse swallowing push their tongues forward, and the results are usually orthodontically harmful. (In fact, this is often why some cases respond slowly or relapse to the appearance of the original protrusive malocclusion after treatment.)/ There is so much to the habit training administered by orthodontists and speech pathologists, that no device could be considered a cure-all. The Secondary Exerciser, however, has proven itself to be a helpful supplemental aid and, on occasion, successful training therapy by itself./ Patient and parents are fully informed about the habit and the various exercises to be practiced. The Secondary Exerciser is given as an additional mechanical training aid with instructions for the patient to practice swallowing 50 consecutive times with the Exerciser in place in the mouth at specified times during the day and evening. / **correcting tongue-thrusting:** Tongue-thrusting differs from reverse swallowing in that it is an additional habit. As the series of movements may be more complicated than reverse swallowing, correcting the habit may demand habit training plus the placing of habit-reminding bands and appliances by the orthodontist. The Secondary

Exerciser, used as prescribed for reverse swallowing, can also be used to speed and simplify treatment for correcting tongue-thrusting. (Users say this technique has proven successful for patients up to 14 years of age.)/ **effective early orthodontic therapy:** Reproductions of the X-rays indicate how the Exerciser can be used in the early correction of certain types of open bites, mouth breathing, etc./ It should be realized that these Exercisers are not panaceas of prevention nor can they be used successfully with every child. Some children will not accept them and some problems cannot be helped by their use. However, in general they are proving helpful, and under professional guidance they are achieving remarkable benefits for many children. / **Nuk Sauger exercisers are still being tested.** Refinements in design continue to be incorporated. Clinicians and individuals conducting tests are receiving samples without charge. Because the supply of Exercisers is limited, Rocky Mountain is scheduling distribution on a priority request basis. We will gladly schedule your request for an experimental kit. Meantime, we will be happy to send you the RM Nuk Sauger Preventive Program booklet and reprints of professional articles on the subject.

American Journal of ORTHODONTICS

Volume 47, Number 8, AUGUST, 1961

ORIGINAL ARTICLES

Roentgenostatics

A practical evaluation of the x-ray headplate

A. MARTIN SCHWARZ, M.D.*

Vienna, Austria

WHEN the tele-x-ray apparatus was first introduced, I was fascinated by the amazing possibilities of seeing the dentition in its relation to the rest of the skull. Hence, my first paper on the x-ray headplate, published after the classic contributions of Broadbent and Hofrath just a quarter of a century ago (in 1935), supplemented Simon's general principles of "gnathostatics" which was in general use in orthodontic diagnosis at that time. The result of my investigations was a practical cephalometric method which I termed "Roentgenostatics."

Fundamentally, in this method, the dentition is demarcated from the skull along the "spina palate" plane (Fig. 1). Therefore, the method is divided into two parts—*craniometry* and *gnathometry*. This division is made to distinguish clearly between the physiologic and morphologic variations of the face and the effects of malocclusion. Only in this way can we avoid the serious fundamental error of confusing the pathologic details of an anomaly with the normal variations to be expected in the individual patient's skull architecture. If such a logical division of study of the cranio-facio-dental complex is made, it becomes obvious that either normal or malformed dentitions can be found combined with any and every type of skull architecture.

CRANIOMETRY

The aim of practical craniometry is to obtain the "ought-to-be" profile. This is the profile which nature gave the patient, without the malocclusion. The difference between the "ought-to-be" profile and the actual profile must be caused by the malocclusion.

Read at the fifty-sixth annual meeting of the American Association of Orthodontists in Washington, D. C., April 24 to 28, 1960.

*Professor, University of Vienna; Emeritus Head of the Orthodontic Department, Vienna Polyclinic.

Fig. 1 demonstrates this concept. It shows the pattern of a lateral cephalometric headplate tracing of a hypothetical person with average relations of cranial and facial parts. The craniometric reference lines are identified as *NSe*,* *H*, *SpP*, *NA*, and *Pn*. The occlusal plane (*OcP*) and the mandibular plane (*MP*) are also shown. Fig. 2 shows a tracing of the average skeletal pattern,

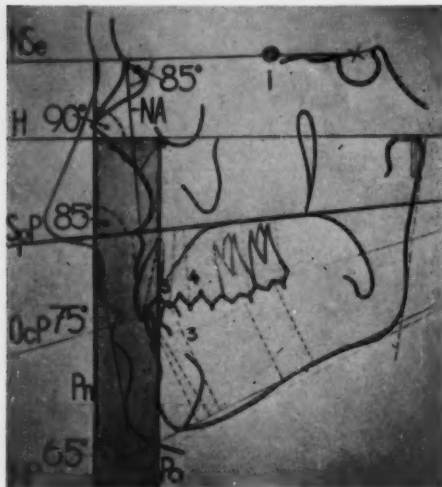


Fig. 1.

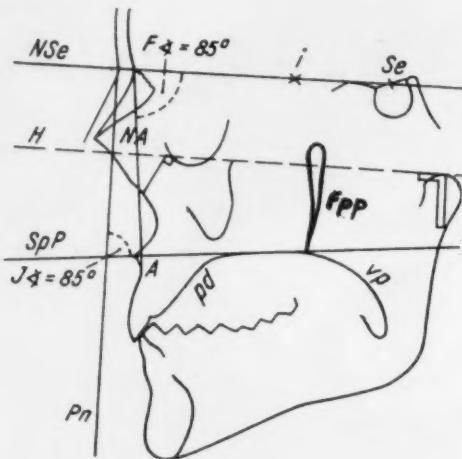


Fig. 2.

Fig. 1. Tracing showing the pattern of a cephalometric headplate with average relations. Note that the spina palate plane (*SpP*) serves as the line of demarcation between the skull and the dentition and as the base plane of the maxilla as well. The *SpP* ascends posteriorly toward the *NSe* plane, with which it forms an angle of about 5 degrees. It also forms an angle of 85 degrees with a perpendicular from the soft-tissue nasion, or the *Pn* plane of Dreyfus. This is called the "inclination angle," or the *J* angle. The information given is similar to that of the facial angle of Downs. It should be noted that the *NSe* plane runs from nasion to the entrance of sella turcica and not to the center of sella turcica, as originally recommended by Broadbent. The *NA* plane, running from the bony landmark, nasion, to point *A* on the maxilla, also forms an angle of 85 degrees with the *NSe* reference plane. The *H* plane, or Frankfort horizontal of Simon, is determined by the skin landmarks of the eye and ear points and runs parallel to the *NSe* plane, forming an angle of about 90 degrees with the *Pn* plane of Dreyfus. Just anterior to sella turcica is point *i*, which lies along the *NSe* plane. This is a fictitious construction to designate the imaginary point around which the dentition apparently rotates in different skeletal types.

Fig. 2. Reference lines for craniometric analysis.

Line *NSe* = Cranial base plane. *Se* is the middle of the entrance of sella turcica. Point *i* is about three eighths of the distance from sella turcica to nasion.

Line *NA*. *A* is the anterior end of the maxillary apical base (Downs).

Line *SpP* = Spina palate plane. *pd* is the hard palate and *vp* is the soft palate.

Line *H* is the Frankfort horizontal plane. *Fpp* is the pterygomaxillary fissure.

Line *Pn* is the Dreyfus nasion-perpendicular plane. The angle formed by *NSe* and *NA* is the facial angle (*F*). The average value, measured as shown by the dotted outline, is 85 degrees. The angle formed by *Pn* and *SpP* is known as the angle of inclination, or the *J* angle. It is measured as shown by the dotted outline, and its average value is also 85 degrees.

**Se* is the entrance to sella turcica rather than the center of the profile outline of the hypophysis cerebri, as originally used by Broadbent. *Se* is interposed between the sellae tuberculum and posterior clinoid processes.

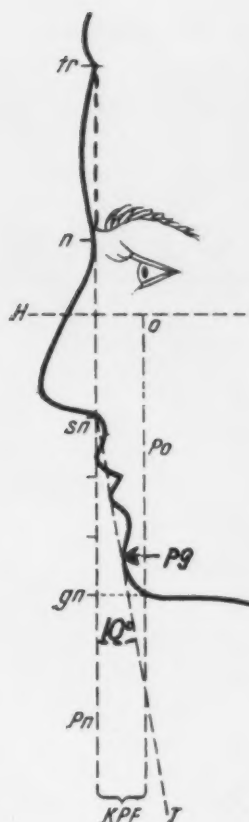


Fig. 3. The average profile.

O = eye point (orbitale), situated one width of the lid cleft below the pupil of the relaxed eye looking forward.

H = Frankfort horizontal plane connecting orbitale and porion (Simon's eye-ear plane).

tr = Hairline (trichion).

n = Skin nasion.

sn = Subnasale.

gn = Skin gnathion.

pg = pogonion.

Pn = Perpendicular to Frankfort horizontal from nasion downward (Dreyfus line).

Po = Perpendicular to Frankfort horizontal from orbitale downward.

KPF = The jaw-profile field enclosed by *Pn* and *Po* (Kiefer-Profile Field).

tr to *n* = The forehead third of the face.

n to *sn* = The nasal third of the face.

sn to *gn* = The jaw third of the face. (The forehead, nasal, and jaw thirds are approximately equal in size. The jaw third may be slightly longer—up to about 10 per cent. The jaw third is divided into three equal parts also; the upper third, from subnasale to the oral fissure, belongs to the maxilla and the other two-thirds belong to the mandible.)

T = Mouth tangent, drawn from subnasale to pogonion, making an angle of 10 degrees with line *Pn*. This is called the *T* angle. On the average, in an ideally formed mouth profile, the *T* line bisects the red border of the upper lip and touches the edge of the lower lip.

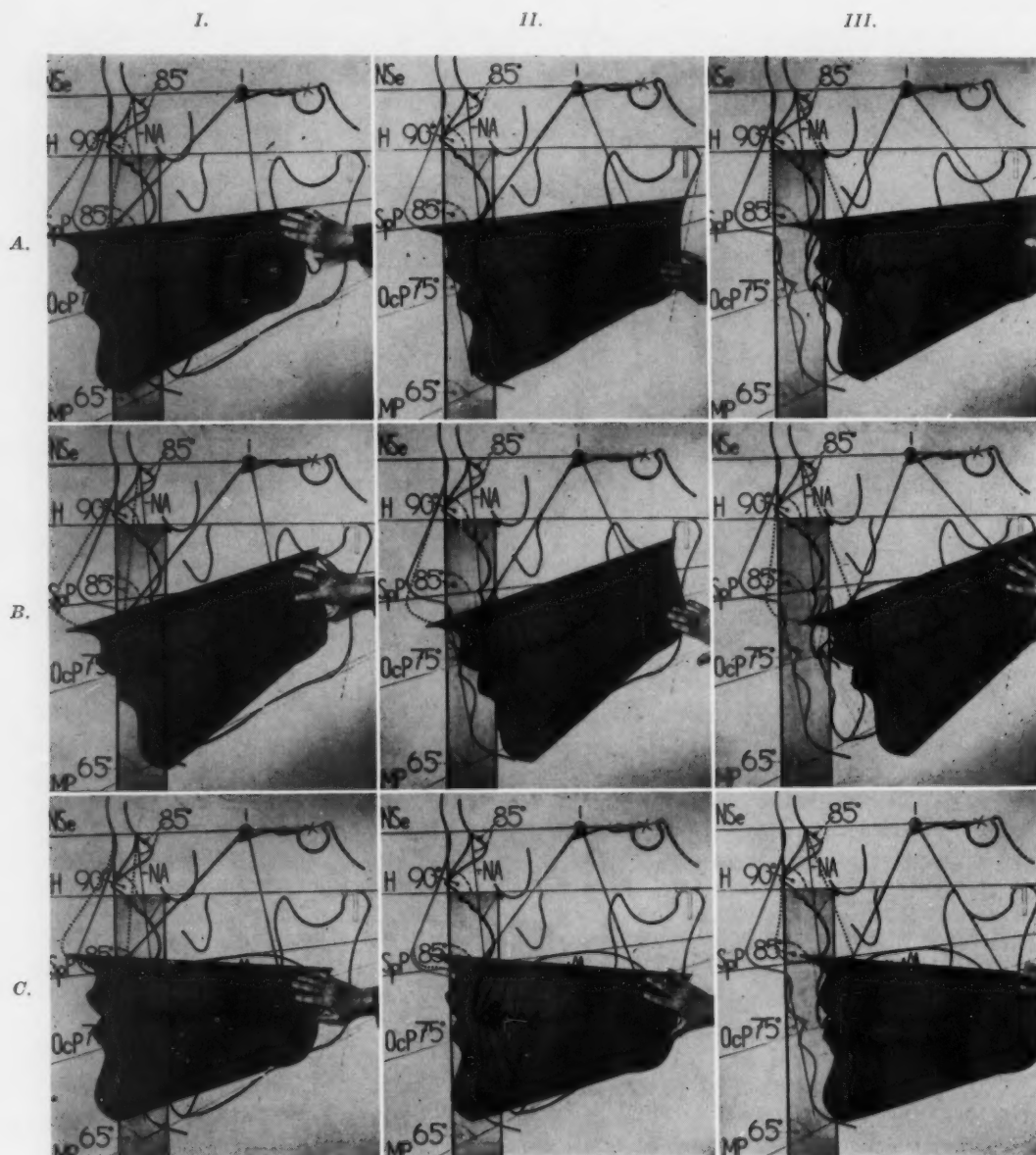


Fig. 4. The nine features of the human profile (without malocclusion) with respect only to the values of the *F* angle and the *J* angle (A. M. Schwarz and H. Brückl).

Horizontal column A: Straight faces, characterized by *J* angle of 85 degrees. Note the parallel shift of the dental area (dark); the *F* angle changes only ante-resp. retroposition.

Horizontal column B: Oblique faces, jaws slanting backward, characterized by *J* angle smaller than 85 degrees; retroinclination.

Horizontal column C: Oblique faces, jaws slanting forward, characterized by *J* angle greater than 85 degrees; anteinclination.

Vertical column I: Antefaces, characterized by *F* angle larger than 85 degrees.

Vertical column II: Average faces, with *F* angle of 85 degrees.

Vertical column III: Retrofaces, with *F* angle smaller than 85 degrees.

and Fig. 3 shows an outline of the average profile and the relationship of anthropometric landmarks. To demonstrate the possible relations of the denture in the face, a large cardboard tracing was made of Fig. 1, and the maxillary and mandibular denture areas were redrawn on another piece of Bristol board. The template of the denture area (dark cut-out) was then mounted on a thin string suspended from point *i*, the hypothetical center of rotation of the denture as related to the skull. This construction (Fig. 4) permits the imitation of all possible physiologic positional variations of the denture as a whole in relation to the skull. These are classified as follows:

1. *Parallel displacements forward and backward.* These positions of the jaws form the straight anteface (forward displacement) and retroface (backward displacement), in accordance with Simon's gnathostatic concept of total protrusion and retraction. With this type of parallel displacement (Fig. 4, *A*), only the facial angle (*NA-NSe*) changes—from a greater to a lesser value or from protrusion to retraction.

These two deviations from the average profile (Fig. 4, *A*, center view) do not cause an impairment of beauty; on the contrary, the large number of Caucasian facial types generally considered pleasing or attractive corroborates the clinical impression of normalcy being a range, as shown by the straight anteface and the straight retroface illustrated in Fig. 5. The tracings (Fig. 5, *A* and *B*) show the profile relations of each photograph to the average face. Since the straight anteface and the straight retroface are equally acceptable as the average, from an esthetic standpoint, the clinician has the opportunity of choosing from three desirable cosmetic groupings.

2. *Rotational displacements around the rotational center point *i*, causing a change in the inclination of the jaws.* These variations in position of the dentition with respect to the face as a whole produce oblique faces. As with the parallel displacements of the dentition, an anteface, an average face, or a retroface may occur.

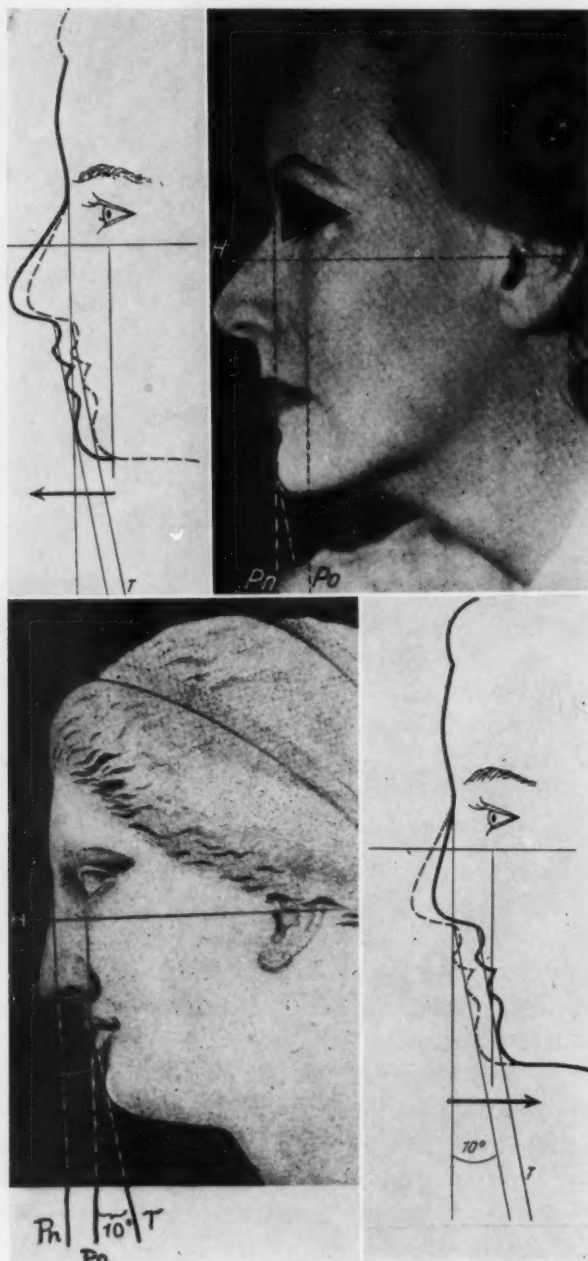
All oblique faces evidently disfigure the profile. The oblique retrofaces with retracted or retroplaced chins resemble faces with Class II, Division 1 malocclusions, and the oblique antefaces with protracted or prominent chins look like faces with Class III malocclusions. It should be remembered, though, that both of these are normal variations of the human skull architecture and may be seen without malocclusion (Fig. 6).

Fig. 4 thus shows that combinations of position and inclination of the dentition in the face produce nine possible profiles of the normal human face: straight, ante-, average, and retrofaces (Figs. 4, *A* and 5), ante-, average, and retrofaces with the jaws slanting backward (Fig. 4, *B*), and ante-, average, and retrofaces with the jaws slanting forward (Fig. 4, *C*.)

To determine the individual architecture of the skull, it is necessary to survey two angles—the facial (*F*) angle and the angle of inclination (*J*). From this survey, the "ought-to-be" profile may be assessed. The *F* angle is formed at the juncture of the nasion-sella plane and the Nasion-point A or facial plane and is, on the average, about 85 degrees (Fig. 2). The *J* angle is formed at the

juncture of the vertical Pn plane (a perpendicular to the nasion-sella plane at soft-tissue nasion, or 8 mm. ahead of bony nasion) and the horizontal spina palate plane which joins the anterior nasal spine and the most superior convexity

A.



B.

Fig. 5. The straight anteface and the straight retroface are considered to be on the same level of beauty as the average face. A, The straight anteface, the ideal of a modern woman's face; note the T angle of 10 degrees. B, Aphrodite of Knidos, representing the classic Greek ideal face; note the T angle of 10 degrees, the straight retroface.

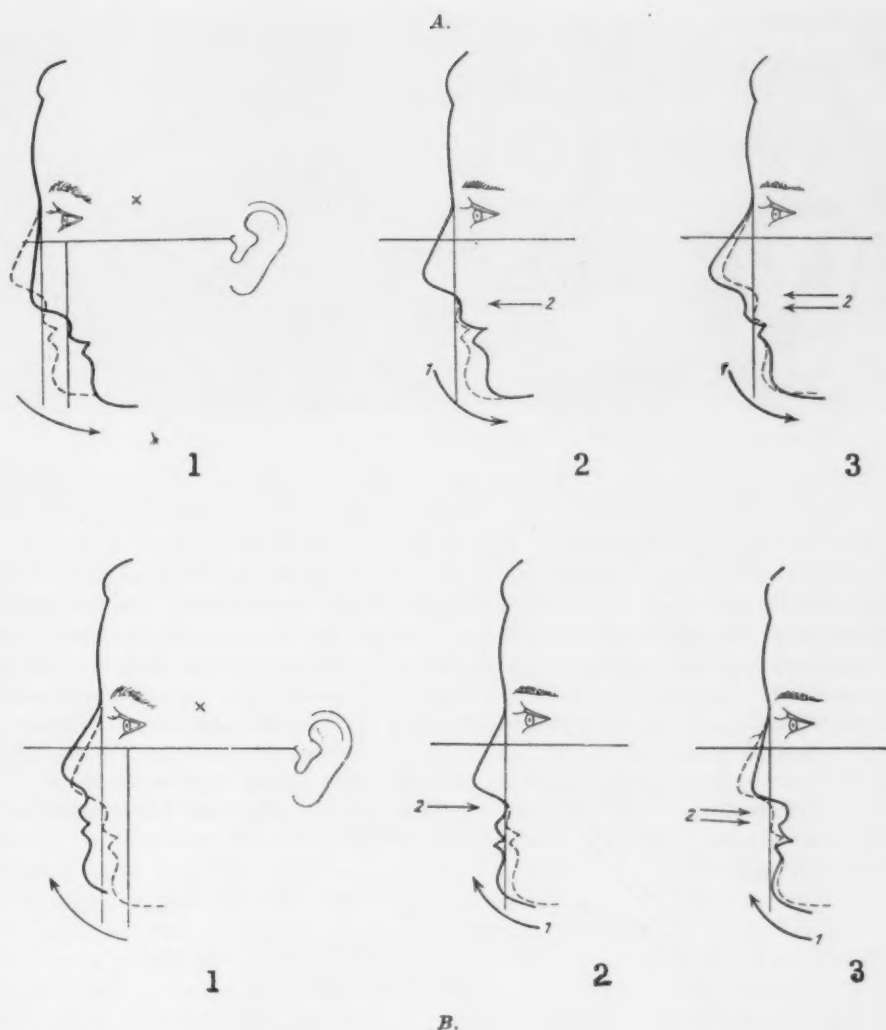


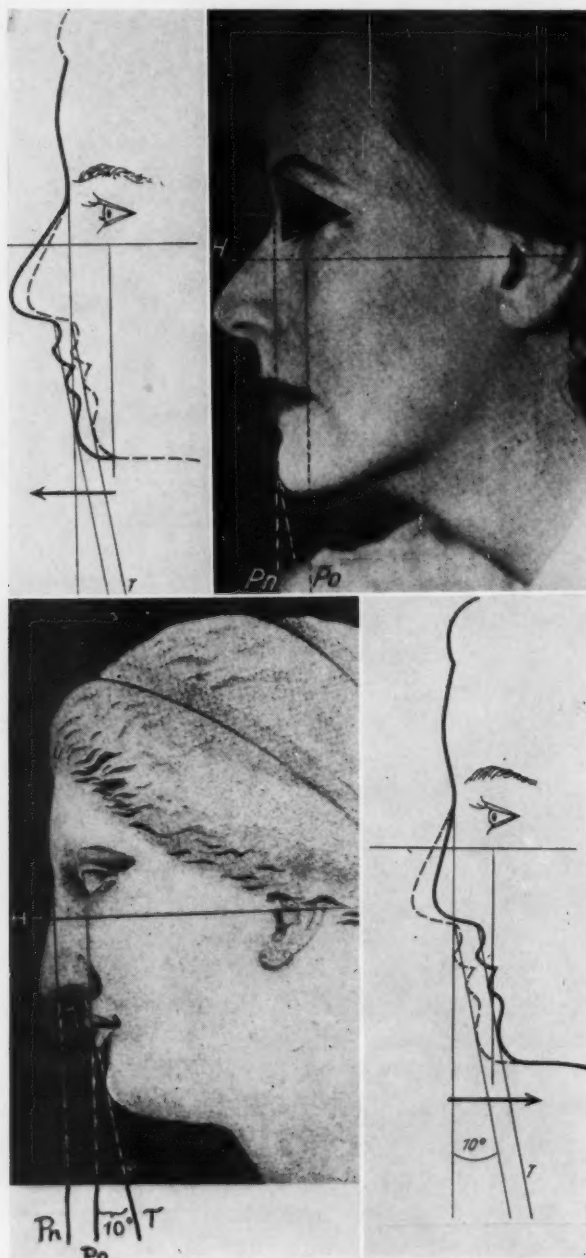
Fig. 6. Oblique faces. The jaw profile is inclined backward or forward in comparison with the average face.

Top row: Oblique faces with jaws slanting backward. The oblique face (solid line), represented by rotation of an average face (broken line) around point *X* in the direction of the arrow; maxilla behind and mandible even more behind the average facial profile (backward inclination); *T* angle more than 10 degrees. Faces 2 and 3 show interplay of an anteposition and a backward inclination (arrows). 2, Combination of a backward inclination with a forward position of the same degree (arrow 2); the result is an average face with the jaw slanting backward. 3, Combination of a backward inclination with a forward position of a higher degree (arrows 2); the result is an anteface with the jaw slanting backward.

Bottom row: Oblique faces with jaws slanting forward. 1, Oblique face (solid line), represented in the drawing by rotation of an average face (broken line) around point *X* in the direction of the arrow; the maxilla in front and the mandible even more in front of the average face (forward inclination); *T* angle less than 10 degrees. Faces 2 and 3 show interplay of a retroposition and a forward inclination (arrows). 2, Combination of forward inclination with a backward position of the same degree (arrow 2); the result is an average face with the jaw slanting forward. 3, Combination of a forward inclination with a backward position of a higher degree (arrows 2); the result is a retroface with the jaw slanting forward.

junction of the vertical P_n plane (a perpendicular to the nasion-sella plane at soft-tissue nasion, or 8 mm. ahead of bony nasion) and the horizontal spina palate plane which joins the anterior nasal spine and the most superior convexity

A.



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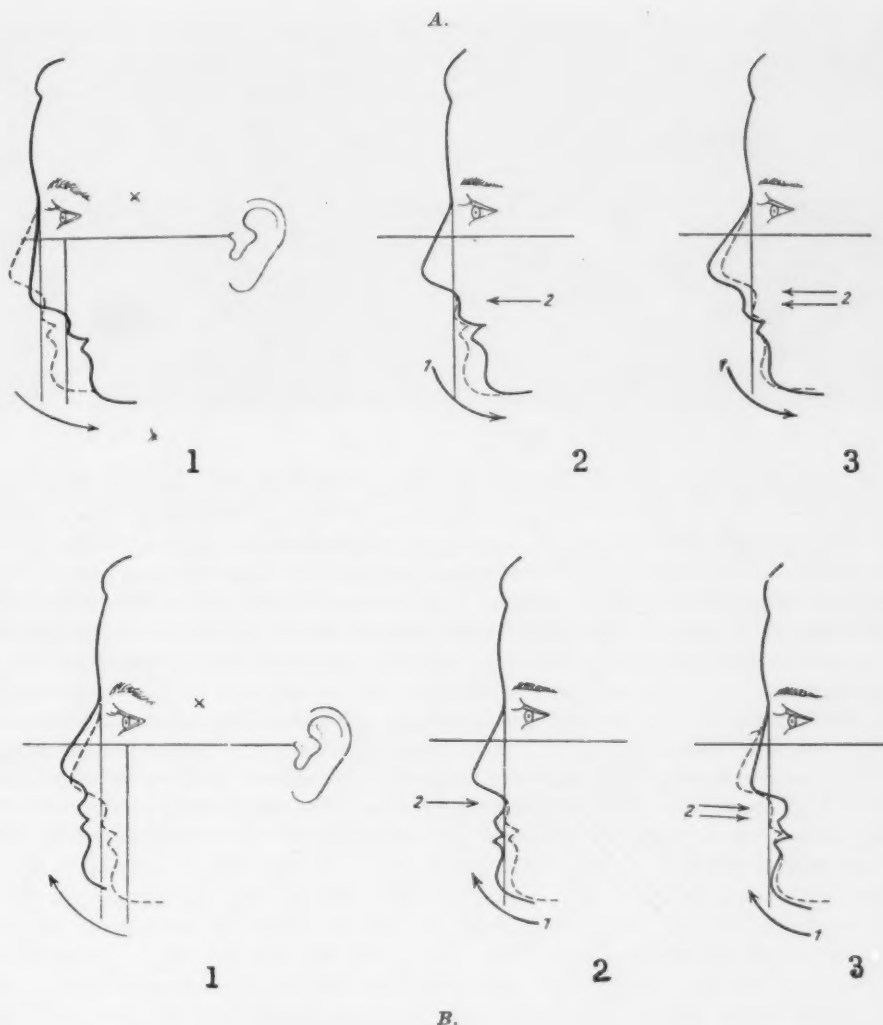


Fig. 6. Oblique faces. The jaw profile is inclined backward or forward in comparison with the average face.

Top row: Oblique faces with jaws slanting backward. The oblique face (solid line), represented by rotation of an average face (broken line) around point X in the direction of the arrow; maxilla behind and mandible even more behind the average facial profile (backward inclination); T angle more than 10 degrees. Faces 2 and 3 show interplay of an anteposition and a backward inclination (arrows). 2, Combination of a backward inclination with a forward position of the same degree (arrow 2); the result is an average face with the jaw slanting backward. 3, Combination of a backward inclination with a forward position of a higher degree (arrows 2); the result is an anteface with the jaw slanting backward.

Bottom row: Oblique faces with jaws slanting forward. 1, Oblique face (solid line), represented in the drawing by rotation of an average face (broken line) around point X in the direction of the arrow; the maxilla in front and the mandible even more in front of the average face (forward inclination); T angle less than 10 degrees. Faces 2 and 3 show interplay of a retroposition and a forward inclination (arrows). 2, Combination of forward inclination with a backward position of the same degree (arrow 2); the result is an average face with the jaw slanting forward. 3, Combination of a forward inclination with a backward position of a higher degree (arrows 2); the result is a retroface with the jaw slanting forward.

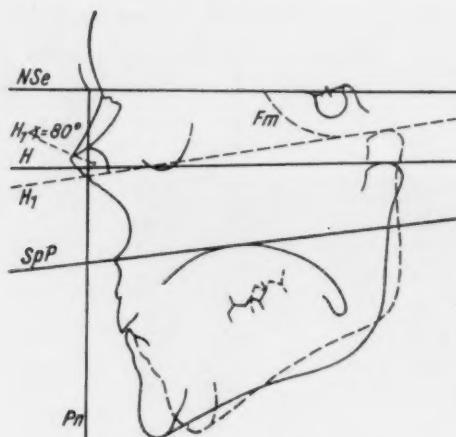


Fig. 7. Supraposition of the temporomandibular joint. The solid line represents the average skull as shown in Fig. 1. H , The average Frankfort horizontal, parallel to the nasion-sella plane (NSe) (H angle, 90 degrees); H_1 (dotted line) represents a Frankfort horizontal plane which indicates a supraposition of the temporomandibular joint in conjunction with a flattened median cranial fossa (Fm); the H_1 angle between Pn and H_1 is 80 degrees, showing a supraposition of 10 degrees; the dotted line indicates the corresponding retrodisplacement of the mandible, provided that it retains its average size and shape. The displacement of the chin caused by the individual position of the joint can be more or less compensated for by such counteracting factors as a longer or shorter mandibular ramus or mandibular body, a larger or smaller gonial angle, or a contrary inclination or different thickness of the skin over the chin—all circumstances which may exist in a person with an absolutely normal dentition. If these factors work in the same direction, the effect can be excessive without producing malocclusion. The movement of the mandible can be visualized as a rotation around the orbital point.

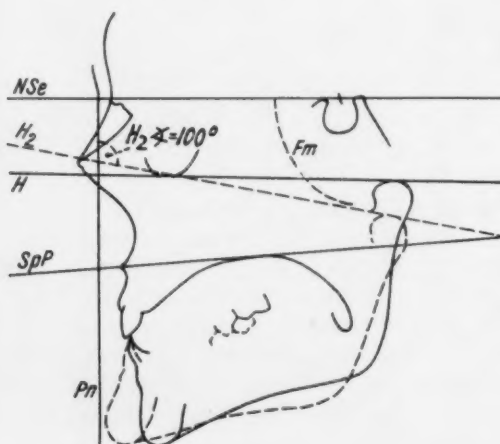


Fig. 8. Infraposition of the temporomandibular joint. The solid line indicates the average skull with H parallel to NSe . H_2 (dotted line) indicates an infraposition of 10 degrees, H_2 angle being 100 degrees; the infraposition of the temporomandibular joint is caused by the deep median cranial fossa (Fm); the middle (dotted lines), as a whole, is moved (as if rotated around the eye point) forward and downward, provided no compensating factors are present.

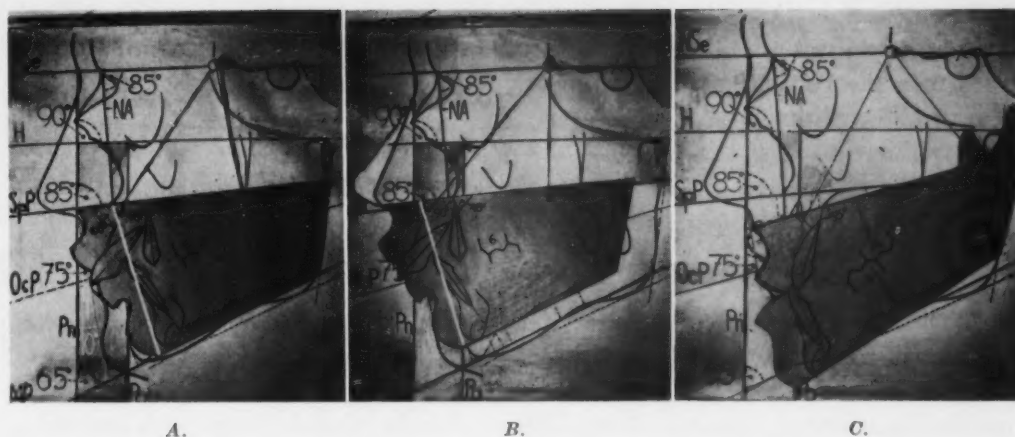


Fig. 9. Study cards, similar to that used in Fig. 1, showing the patterns of typical malocclusions. The darkened denture portion is suspended by wires from a button at point *i*.

A and *B*, Class II, Division 1 malocclusion caused by an underdeveloped mandible. Note white line *A-pgo* (Downs' line *A-P*), forming a maxillomandibular angle of 100 degrees with *SpP* instead of the 90 degree angle which is average. The enlarged maxillomandibular angle indicates the retroplaced mandible relative to the maxilla; comparison with the distance from nasion to sella turcica indicates that the mandible is underdeveloped in length in this case.

A, Suspended in average position; the ought-to-be profile of this skull architecture is an average face (Fig. 4, *A*—horizontal line middle); the retroplaced mandible causes an actual retrusion of the profile. In the average face, the jaw slants backward with a positive (protruded) mouth profile; the ideal method of treatment is to bring the mandible forward if possible.

B, Forward position of the same Class II, Division 1 dentition as a whole. The ought-to-be profile is a straight anteface (see left-hand drawings in Fig. 4, *A*, *B*, and *C*). The mandible, in spite of being underdeveloped, assumes its average or proper place. The normal maxilla seems to be in a protruded position. If the clinician ignores the patient's skull architecture (which in this case shows a straight anteface), he may diagnose the problem erroneously, calling it a Class II malocclusion with a normal mandible but an overdeveloped maxilla, and he may decide to retrude the maxilla by removing the first premolars. The ideal treatment plan in this case would call for the mandible being brought forward to satisfy nature's demand for a straight anteface in keeping with the patient's skull architecture.

C, The pattern of a Class III malocclusion caused by an excessively long mandible is suspended on the cardboard master tracing in retroinclination. Since the mandible occupies a normal or average position, the normally developed maxilla seems to be retruded. Here, too, a wrong diagnosis may be made if the patient's skull architecture is ignored. The correct procedure is to retrude the mandible in order to obtain the retroface intended by nature.

of the palatal contour (Fig. 2). Like the *F* angle, the *J* angle is 85 degrees, on the average. Qualifying this assessment, the relationship of the temporomandibular joint with reference to the nasion-sella plane must be considered. As Fig. 7 shows, the supraposition of the joint, in conjunction with a flattened middle cranial fossa, produces a retrodisplacement of the mandible. In Fig. 8, the infraposition of the joint, combined with a deep middle cranial fossa, seems to rotate the mandible downward and forward around orbitale, producing an oblique anteface (dotted line). This variation may occur regardless of the

occlusion. An additional qualifying angle is the relationship of the Frankfort horizontal and nasion-sella planes as described by Moorrees and Kean. Also of concern is the contour of the forehead, as it creates optical variations in the total profile outline.

To illustrate how the "ought-to-be" profile is altered by a given malocclusion, the cardboard elements that make up Fig. 4 may be manipulated to demonstrate different malocclusions (Fig. 9).

GNATHOMETRY

The aim of practical gnathometry is to ascertain, by certain measurements, the important morphologic details of various malocclusions. In this way, there is evolved a new system of diagnosis which should give significant insight into the characteristic symptoms of anomalies; this is possible only with the teleroentgenogram.

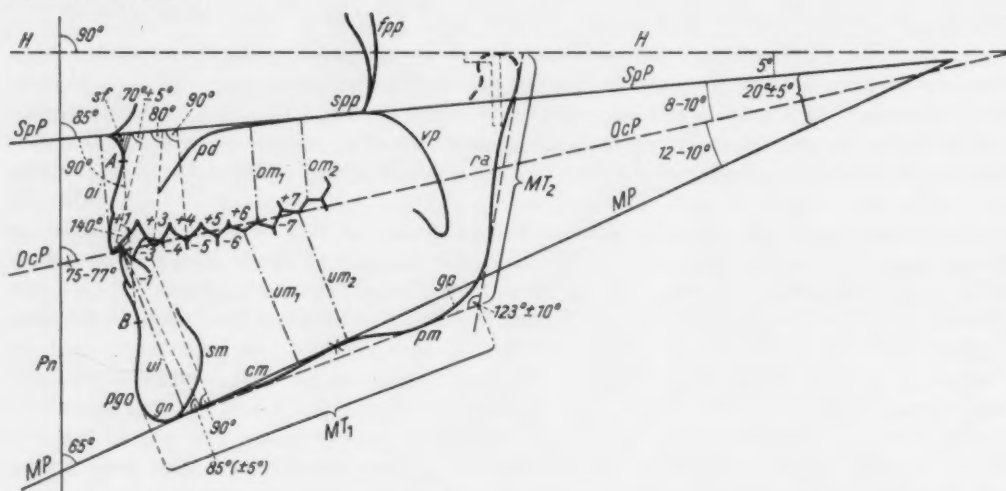


Fig. 10. The average dentition separated from the skull along *SpP*, contained between its two base planes *SpP* and *MP*. *pd*, Palatum durum. *vp*, Velum palatinum. *fpp*, Pterygo-palatine fossa. *spp*, Posterior nasal spine. *cm*, Corpus mandibulae. *ra*, Ramus ascendens. *gn*, Gnathion. *pgo*, Pogonion osseum. *go*, Gonion. *pm*, Masseteric protuberance. *X*, Notch of lower margin of mandible. *sm*, Spina mentalis. *OcP*, Occlusal plane drawn from the central incisors to the first molar. *MT₁*, *MT₂* (interrupted lines), Tangents of body and ramus of mandible including gonial angle which averages 123 degrees \pm 10 degrees; length ratio of *MT₁* relative to *MT₂*, 7:5. *sf* (hatched lines), Field of the anterior nasal spine. Point *A* (Downs), Anterior end of upper apical base; *B*, anterior end of lower alveolar bone. (The *A-B* line, extended upward, meets *SpP* to form the *AB* angle, its average size being 90 degrees. The *A-B* line, extended downward, touches *pgo*. The line *pgo-B-A*, continued upward, touches *SpP* to form the maxillomandibular angle, its average size being 90 degrees, or identical to the *AB* angle.) *oi*, *om₁*, *om₂*, *ui*, *um₁*, *um₂*, Distances of the incisors and molars to the base planes. (Relations: *oi*:*ui* = *om₁*:*um₁* = 2:3, *oi*:*om₁* = *ui*:*um₁* = 5:4.) The fine interrupted lines represent the axes of the upper central incisor, canine, and first premolar and the lower central incisor and canine and their average axis angles; the average size of the upper central incisor angle is 65 degrees in children and 70 degrees in adults; the upper canine angle is 80 degrees, and the upper first premolar angle is 90 degrees; the lower central incisor angle is 85 degrees in children and 90 degrees in adults; the lower canine angle averages 90 degrees; the axes of the upper and lower central incisors form the interincisal angle (*ii* angle), its average size being 140 degrees \pm 5 degrees.

The spina palate plane, as the key to practical cephalometric diagnosis, has two functions: (1) to serve as the limit between the skull and the dentition and (2) to act as the base plane for the maxilla, even as the mandibular plane is the base plane for the mandible. It is between these two base planes (Fig. 10) that the innumerable malformations of the dentition occur.

The wealth of details presented in Fig. 10 may seem complex and possibly confusing at first glance. However, since we must evaluate the peculiarities that exist in the immediate area of our endeavor, if we do it any place, many systematic measurements are necessary. Only in this way can gnathometry have distinct diagnostic significance. Only by making these measurements can we make a new diagnosis of malocclusions on the basis of important morphologic components.

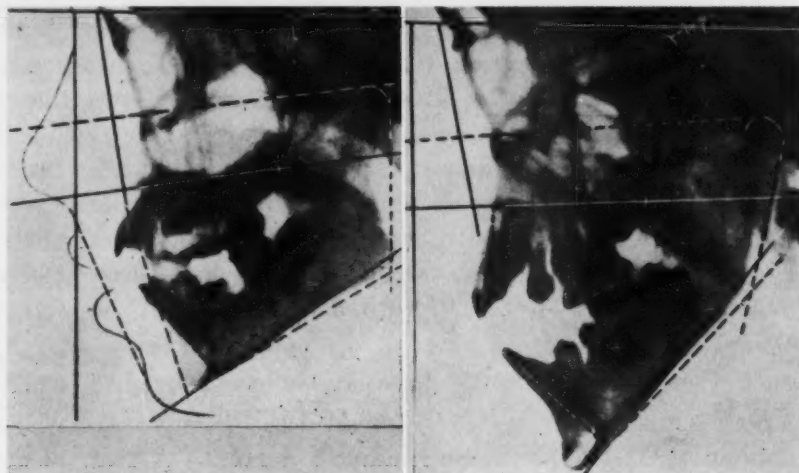
In an article of this type, it is impossible to discuss the many ramifications of the diagnostic procedure. The reader is referred to my pamphlet entitled *Roentgenostatics* (1960; Leo L. Bruder, Brooklyn, New York, distributor), which is now published in English. Some examples have been selected from this comprehensive study, however, to illustrate a number of the advantages of gnathometry.

For practical purposes, the following relations have proved to be significant:

1. The *base plane angle* (*SpP-MP*) is called the *B* angle. On the average, this angle measures 20 degrees, plus or minus 5 degrees. A reduced or smaller *B* angle is usually a sign of a well-developed masticatory system. An enlarged or greater *B* angle indicates underdevelopment of height in the molar region. A large *B* angle is the main qualification of the serious type of "gnathic" open-bite. The *B* angle influences the height position of the opposing teeth also. Fig. 11, *B* demonstrates the typical morphologic characteristics of the difficult-to-treat *gnathic* open-bite. Immediately apparent are, first, the greatly enlarged *B* angle and, second the greater gonial angle. Apparently as an adjustive or homeostatic response, the alveolar process evidences a paradoxical adaptation in height. In the first molar region, which bears the brunt of functional forces, jaw height is approximately normal. The molars posterior to the first molars are depressed, however, while there is a marked overeruption of the teeth anterior to the first molars which increases in severity as the incisor segment is reached. Thus, despite the fact that the incisors are overerupted, often double the amount of the molars, the adaptive eruptive process has not been great enough to accommodate for the basal bone dysplasia. It is no wonder that orthodontic therapy fails so often in these cases, for we try to depress the molars even more and to elevate the incisors even more, when they are already close to the limits of dental and alveolar adaptation for a jaw malrelationship.

The *alveolar* type of open-bite is easier to treat, but here, too, it is important to differentiate between two groups: (1) the harmless open-bite which results from sucking or biting habits, with normally shaped incisors which are actually only depressed (Fig. 11, *A*), and (2) the open-bite caused by a systemic disease, such as rickets, with pathologically short teeth, mutilated crowns, and short, underdeveloped roots surrounded by a lower level of alveolar bone (Fig. 12).

Fig. 11 shows the important information that may be gained from the cephalometric headplate. It depicts two cases which seem to involve the same kind of easy-to-treat open-bite caused by a sucking habit, for the habit exists in each case. The headplates tell us otherwise. In the case shown in Fig. 11, *A*, conventional therapy is indicated, but in the case shown in Fig. 11, *B*, with a true gnathic open-bite fully developed in the early mixed dentition, it is probable that Schönherr's approach is indicated. This means the extraction of the four



A.

B.

Fig. 11. Two cases of open-bite which appear clinically similar. The cases have the same diagnosis (sucking open-bite), but the headplates show the fundamental differences.

A, Harmless alveolar open-bite caused by sucking habit only. Note low frontal alveolar bone, depressed and protruded incisors (upper incisor angle, 53 degrees; lower incisor angle, 83 degrees), and nearly average gnathic relations. (From the collection of Prof. Reichenbach, Halle, Germany.)

B, Severe gnathic open-bite with all characteristic symptoms. The *B* angle is 50 degrees, and the gonial angle is 150 degrees. In spite of the sucking habit, incisors are overerupted. The pseudoprotrusion is present in spite of retruded incisors (upper incisor angle, 80 degrees; lower incisor angle, 93 degrees). The anterior portion of the jaw is overelevated (nasal third, 44 mm.; anterior jaw height, 70 mm.; lower posterior jaw, 33 mm.). The temporomandibular joint position is high. (From the collection of Prof. Häupl, Düsseldorf, Germany.)

first permanent molars at the precise time when these teeth bear the brunt of occlusal forces almost alone. In other words, the first premolars must be extracted before the second molars erupt and at the time the first and second deciduous molars are being shed. Although it is radical, this apparently is the most successful therapy.

Open-bite is not an entity to itself; it may be combined with all kinds of skull architecture (ante- or retroposition and ante- or retroinclination of the dentition) and all types of malocclusion, as Class II or III.

2. *The axial inclinations of the teeth* are important clinical considerations and are measured facially or anteriorly as the long axes intersect their respective base planes (Fig. 10).

The average angles for upper central incisors, canines, and first premolars are 70, 80, and 90 degrees; for the lower incisors and canines, the angular reading is 90 degrees. All values have a range of plus or minus 5 degrees. In the mixed dentition, the long axis angle is a little less than 70 degrees for maxillary incisors (65 degrees), and the mandibular incisors are also more pro-cumbent by about 5 degrees (85 degrees). Björk notes an increase in incisor uprightness from the mixed dentition to the adult dentition, with an increase in

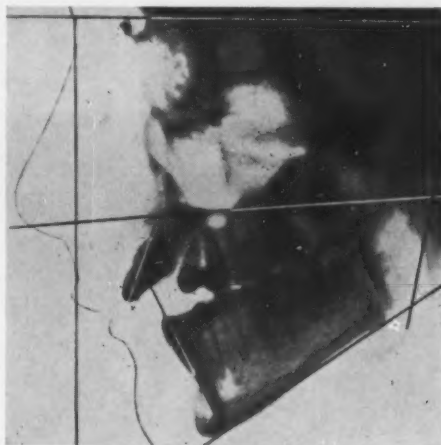


Fig. 12. A chiefly alveolar open-bite, caused by rickets, in the permanent dentition. Note underdeveloped incisors with malformed short crowns and short roots and low frontal alveolar bone. *B* angle is slightly enlarged (30 degrees). (From the collection of Prof. Reichenbach, Halle, Germany.)

the lower incisors to 90 to 95 degrees. Schaeffer observes a similar change in upper incisor inclination to 70 to 75 degrees. These values show the precise degree of protrusion or retrusion of the incisors and indicate the contribution of buccal segment teeth to the malocclusion, depending on the degree of departure from the average, on whether or not spaces are present, etc. Granting a 5 degree range of normalcy, upper incisions may be considered protrusive when the angle is less than 65 degrees and retrusive when it is more than 75 degrees. Lower incisors may be considered protrusive when the angle is less than 85 degrees and retrusive when it is more than 95 degrees.

The projection of the long axes of the incisors until they intersect forms an interincisal angle, which is measured internally or toward the tongue. The average for this angle is 140 degrees, plus or minus 5 degrees. If the lips are normally shaped, an interincisal angle of 140 degrees may be considered an essential requisite for the ideal mouth profile curve (Fig. 3). This value is automatically provided by the quadrangle formed by the long axes of the incisors and their respective bases (Fig. 13). When there is an enlarged *B* angle (Fig. 14, *B*), the interincisal angle must be smaller, in spite of which the incisors may remain in ideal position and the chin may recede; a "broken bite" and "pseudo-protrusion" result (Fig. 14, *A* and *B*), in contrast to a true bialveolar (bi-maxillary) protrusion (Fig. 14, *C*). An enlarged *B* angle may also lead to an

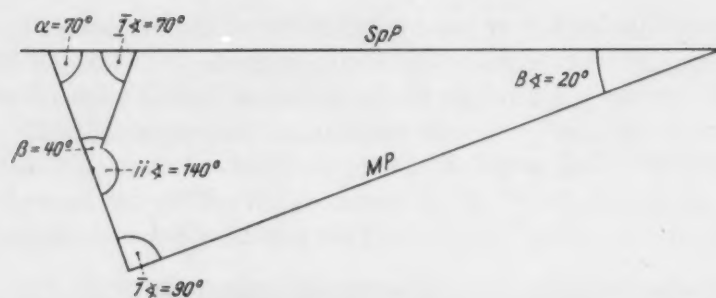


Fig. 13. (For legend, see opposite page.)

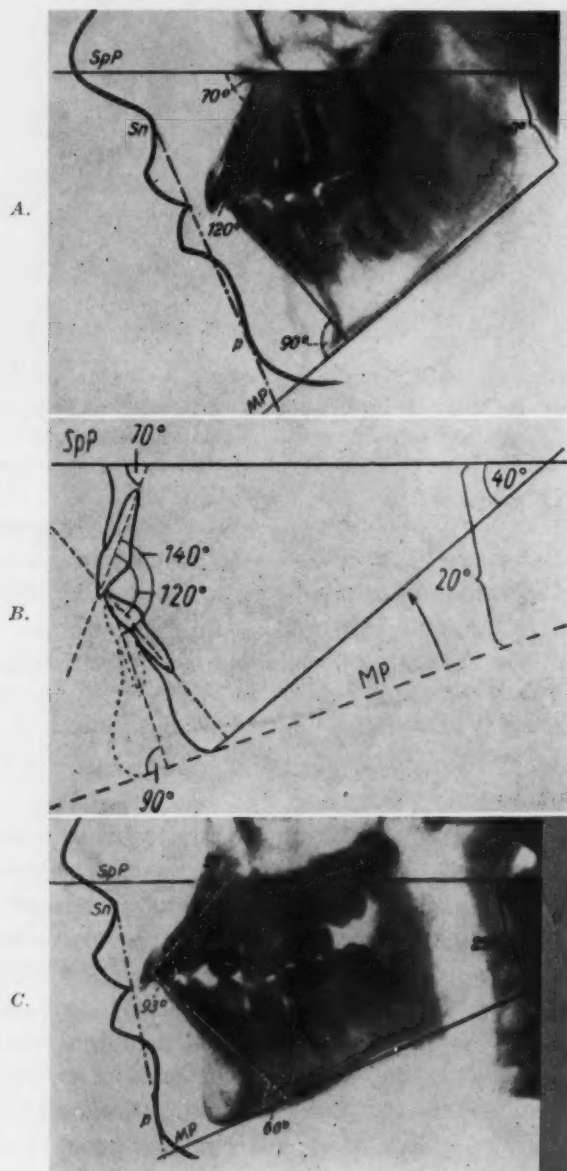


Fig. 14. (For legend, see opposite page.)

open-bite, as noted previously, in addition to a disturbed height relation of anterior and buccal segment teeth. This adds a third cause of congenital open-bite to the two causes already elucidated, namely, sucking habits and rickets.

3. The intersection of a line joining Downs' points A and B above with the spina palate plane and below with pogonion forms an angle of 90 degrees with the spina palate plane in many cases. The lines joining points A and B and A and pogonion often diverge, however, depending on the "chin button." In such cases, the *angle formed by the point A-pogonion line and the spina palate plane* is important, as it indicates the relationship of the bodies of the maxilla and mandible to each other. This is called the maxillo-mandibular angle. Its average value as already noted is 90 degrees.

If the angle is enlarged, opening toward the front, it is a sign of:

- (1) a repositioned mandibular corpus, probably combined with deficient mandibular length;
- (2) an enlarged *B* angle (angle of maxillary and mandibular bases); or
- (3) a supraposition of the temporomandibular joint (Fig. 7) which is not compensated for by a correspondingly longer ramus.

A reduced maxillomandibular angle results in the reverse of these three characteristics. It is important to relate the effect of the *B* angle on the size of the maxillomandibular angle. Every 10 degrees of change in the *B* angle corresponds to about a 7 degree change in the maxillomandibular angle. A

Fig. 13. The average sizes of the *B* angle, upper incisor angle, and lower incisor angle automatically form the average size of the interincisor angle. Lines *SpP* and *MP* form a *B* angle of 20 degrees; the lower incisor forms an angle of 90 degrees with its base plane, and extended to the *SpP* plane it forms a supplementary angle of 70 degrees; the long axis of the upper incisor forms an angle of 70 degrees intersecting the long axis of the lower incisor, forming a triangle with a resultant angle of 40 degrees. Thus the interincisor angle is 140 degrees.

Fig. 14, *A*, "Pseudoprotrusion" caused by a *B* angle which is twice the average size. In spite of the average positions of the incisors (upper incisor angle, 70 degrees; lower incisor angle, 90 degrees), the interincisal angle is reduced to 120 degrees, forming the "broken bite" and the protruded mouth profile. If the basal angle is enlarged, the relative heights of the incisors and molars as measured to their respective base planes must be abnormal in order to avoid an open-bite. The patient must have elevated front teeth, depressed molars, or both. This proves to be the situation in the case shown here with an extraordinary compensating elevation of the upper and lower incisors with respect to the molars. Where there is less compensatory eruption, an open-bite may result.

B, Schematic drawing to explain Fig. 14, *A*. The *B* angle is enlarged from 20 degrees (dotted outline) to 40 degrees, creating a "broken bite" and pseudoprotrusion. This change in mandibular plane inclination causes the chin to recede as in a Class II, Division 1 malocclusion.

C, True bialveolar (bimaxillary) protrusion. The incisors are procumbent, with an upper incisor angle of 50 degrees, a lower incisor angle of 56 degrees, and an interincisal angle of 93 degrees (the average angles being 70 degrees, 90 degrees, and 140 degrees, respectively). The *B* angle of 23 degrees is within the average range. Note the protruded mouth profile and compare this with the profile shown in Fig. 14, *A*.

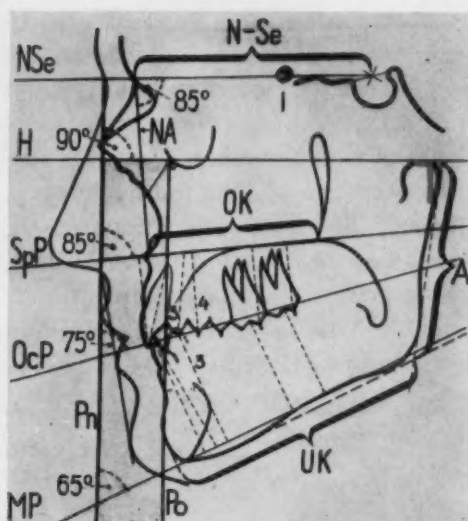


Fig. 15. The average length of the upper and lower jaws relative to the distance from nasion to sella turcica (*N-Se*); the average ratio of *N-Se* to *UK* is 60:63. This means that the ought-to-be length of the mandibular corpus is the *N-Se* distance plus 3 mm. The average relation of the ramus (*A*) to the corpus (*UK*) is 5:7 (Korkhaus). This means that the average length of the ramus is five-sevenths the length of the corpus. The average relation of the upper jaw (*OK*) to the mandibular corpus (*UK*) is 2:3, so the average length of the maxilla is two-thirds that of the body of the mandible.

large difference in the *AB-SpP* and maxillomandibular angles indicates an abnormal relationship between alveolar bone and the corpus of the mandible.

4. The *length relation of the jaws* is an important clinical criterion (Fig. 15). For the actual length of the maxilla, a measurement is made along the spina palate plane from projected point *A* to the outline of the pterygomaxillary fissure as it crosses the spina palate plane. This approximates the posterior nasal spine. The length of the body of the mandible is measured along the mandibular tangent *MT₁* (Fig. 10). Ramus length is measured from gonion upward along the posterior border to where it intersects the Frankfort horizontal plane, or to the top of the capitulum if the latter is seen more clearly (Fig. 15).

The average length of the jaws is calculated in comparison to the length of the anterior cranial base. A dolichocephalic person, for example, has a longer jaw-skeleton ratio than a brachycephalic person. The distance from nasion to sella is considered as the anterior cranial base. It varies from a little more than 60 mm. to somewhat more than 70 mm. The average anterior cranial base-upper jaw length ratio, according to Schmuth-Tiegelkamp is 10:7; the average relationship of upper jaw to lower mandibular corpus length is 2:3. Therefore, the average nasion-sella-pogonion-gonion length ratio is 20:21 or 60:63. This means that, as a rule, the average "ought-to-be" length of the mandibular body is the same as the distance from nasion to sella, plus 3 mm. The "ought-to-be" length of the maxilla is two-thirds and, according to Korkhaus, the length of the ramus is five-sevenths of the mandibular body length.

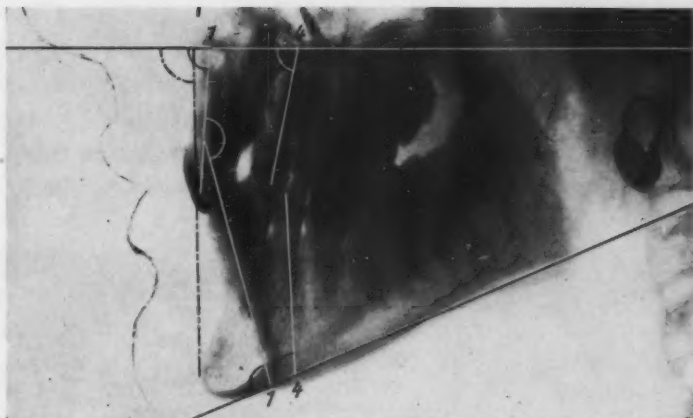


Fig. 16. Class II, Division 2 alveolar type of retroclulsion with an upper and lower anterior retrusion of medium degree. The upper incisor angle is 87 degrees, and the lower incisor angle is 100 degrees. The upper first premolar angle is 80 degrees, however, indicating a mesial tipping. The lower buccal teeth are apparently tipped distally, since the reading is 110 degrees whereas the average angular reading is 90 to 95 degrees. The interincisal angle is 160 degrees, the *B* angle is 23 degrees, and the maxillomandibular angle is 91 degrees.

In connection with the foregoing ratios, the largest group of cases being treated by orthodontists (Class II, Division 1 malocclusions) should be considered. An astute clinician already knows that a multitude of essentially different morphologic variations may lead to a single common symptom of retroclusion. He must differentiate, however, between the alveolar and gnathic types of Class II malocclusion, even as with open-bite.

The symptoms of alveolar Class II malocclusion are contrarily inclined buccal segment teeth, or bodily displaced teeth and immediate supporting alveolar bone along the jaw bodies. As shown in Fig. 16, the upper buccal teeth,

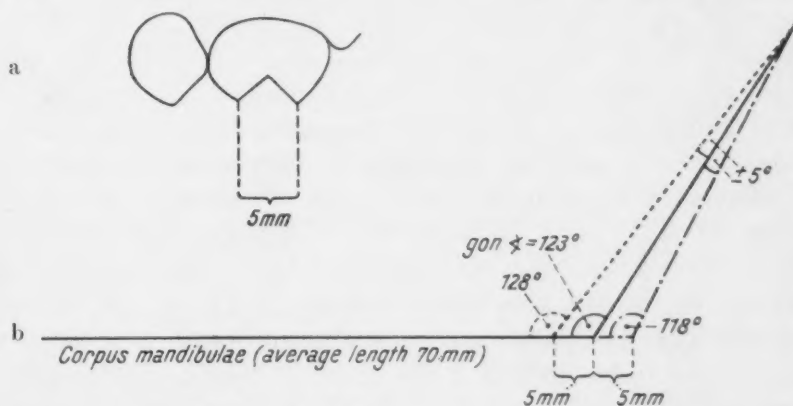


Fig. 17. The relationship of the gonial angle to the sagittal malocclusion. *a*, The decisive distance between the two buccal cusps of the first molar. Changing the occlusion into a Class II or Class III malocclusion requires only a shift of 5 mm. *b*, The length of the body and ramus of a mandible of average size. Displacement of the body forward or backward for a distance of 5 mm, or a change of only 5 degrees in the gonial angle can produce a shift of one cusp in the buccal occlusion.

beginning with the first premolar, are tipped forward and the lower antagonists are tipped backward to establish the Class II relationship. Jaw or basal relationship is normal. As shown in Fig. 17, a distance of only 5 mm. must be traversed to change from a Class II to a Class I relationship, and vice versa. Consequently, antagonistic teeth of average root length which rotate around the middle third of their roots need a tilt of less than 10 degrees—the upper mesially

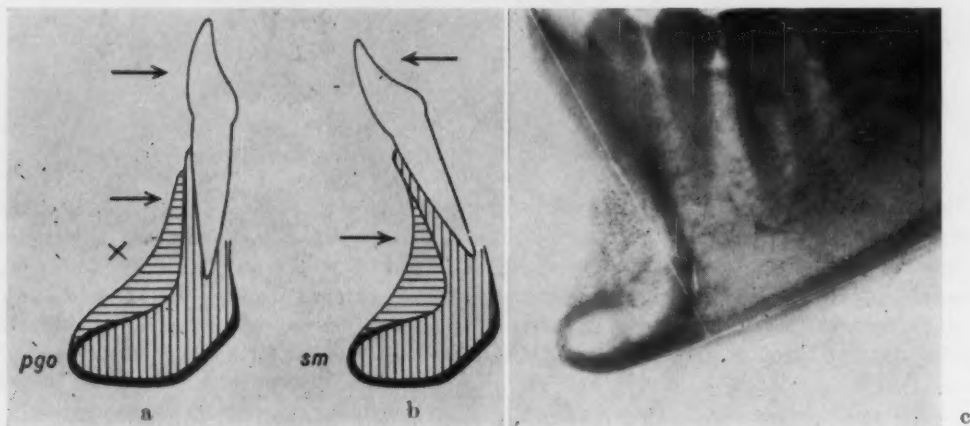


Fig. 18. Abnormal cross section of the symphysis of the mandible as seen in the lateral headplate.

a, Retroposed alveolar bone as a whole (arrows). The thick dark lines show the compact bone surface of the mandible forming the true anterior end of the body (*pgo*) and the spina mentalis (*sm*); the spongiosa and alveolar bone of the mandibular body are vertically hatched; the appositional spongiosa in the supramental region is horizontally hatched. This bone fills in the deep niche formed by the retroposed alveolar apical bone and the receding body. *b*, Apically retruded alveolar bone with the incisor tipped labially (arrows) and the incisor axis running behind the spina mentalis. *c*, Radiographic cross section of *a*.

and the lower distally—to produce a retroclusion. Likewise, a 5 mm. bodily displacement of the teeth the width of a whole cusp would produce a Class II relationship. This means, of course, that the upper teeth would move 2.5 mm. mesially and the lower teeth 2.5 mm. distally. The lateral headplate will show such displacement of buccal teeth and the type of retrusion (alveolar, gnathic, or a combination of the two). Also, as Fig. 18 shows, the cross-sectional image of the mandibular symphysis is seen clearly, and the relative position of the alveolar process on the base may be ascertained.

The most frequent gnathic component of retroclusion is a deficient length of the mandibular body, making it too short in relation to its own average length demands or too short with respect to an overelongated maxilla. The deciding criterion of alveolar versus gnathic mandibular retrusion is the value of the maxillomandibular angle. As pointed out earlier (Fig. 20), the maxillomandibular angle is approximately 90 degrees with an average base angle. If the base angle is larger or smaller, the first consideration is its influence on the maxillomandibular angle. For every 10 degree change in the base angle, there is

a 7 degree change in the maxillomandibular angle. If, after the influence of the base angle on the maxillomandibular angle is taken into consideration, the 90 degree reading still remains, only an alveolar type of Class II malocclusion is present (Fig. 16). A larger maxillomandibular angle that is opened anteriorly is more likely to indicate a gnathic type of Class II malocclusion (Fig. 19). In this type of problem a normal relationship of the maxilla and mandible is disturbed.

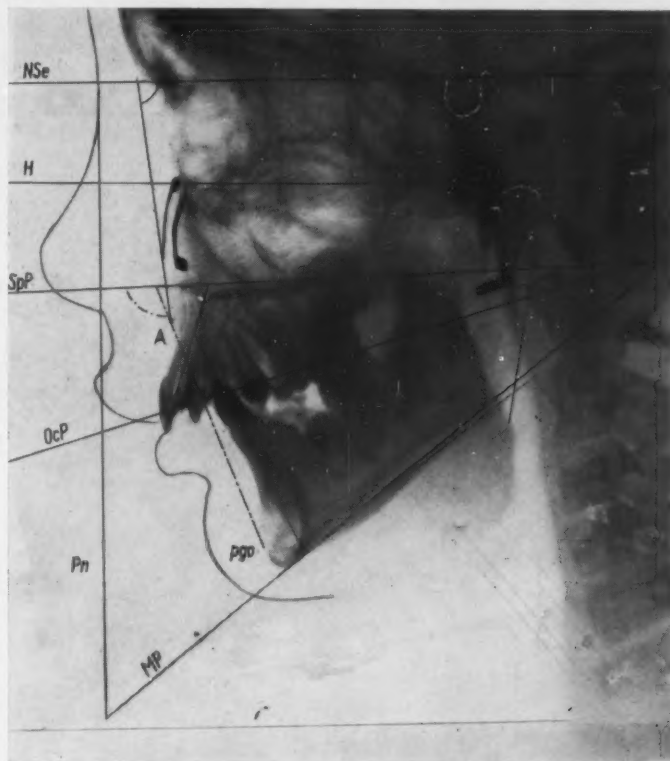


Fig. 19. A "gnathic" Class II, Division 1 malocclusion with an underdeveloped mandible which is totally retruded. This 9½-year-old boy has an enlarged *B* angle. Gnathometric data: upper incisor, 70 degrees; lower incisor, 103 degrees; no upper protrusion but upright and retruded lower incisors; interincisal angle, 135 degrees; overjet, 12 mm. $oi:ui = 30:40$ mm. (average, 2:3), $oi:om_1 = 30:16$ mm. = nearly 2:1 (average, 5:4); overelevated upper front; $ui:um_1 = 40:25$ mm. = 5:3.1 (average, 5:4); low molar area; anterior jaw height to bony nose third = 62:42 mm. = 3:2 (average, 5:4), anterior to posterior jaw height = 62:35 = 3:1.7: underdeveloped molar area.

Length relations: *S-Ne*, 68 mm.; corpus of mandible, 61 mm. (average, 71 mm.); ramus 43 mm. (average, 50 mm.); mandible underdeveloped as a whole; upper jaw length, 45-47 mm. (posterior nasal spine not seen clearly) (average, 47.5 mm.).

Treatment: Forward tipping and depression of the lower incisors, retrusion of the upper incisors to 75 degrees, and forward movement (length development) of the body and ramus of the mandible. The result is a moderately backward-slanting jaw profile with a nearly average mouth profile.

Many cases of Class II malocclusion are mixed, showing both alveolar and gnathic symptoms. In outlining a treatment plan, the orthodontist must decide

which of these contributions is of the greatest importance and which may be treated most effectively. The same distinction of a gnathic versus an alveolar type of Class III malocclusion is required as for the open-bite type of case and the Class II problem.

As with these other malocclusions, the cephalometric headplate is of great value in Class III cases. Fig. 21 shows a genuine mandibular prognathism of marked degree in an 18-year-old female patient. The headplate was made in rest position, with the mandible slightly retruded from the centric occlusion relationship. Thus, the apparent effect of the serious anomaly is reduced. The

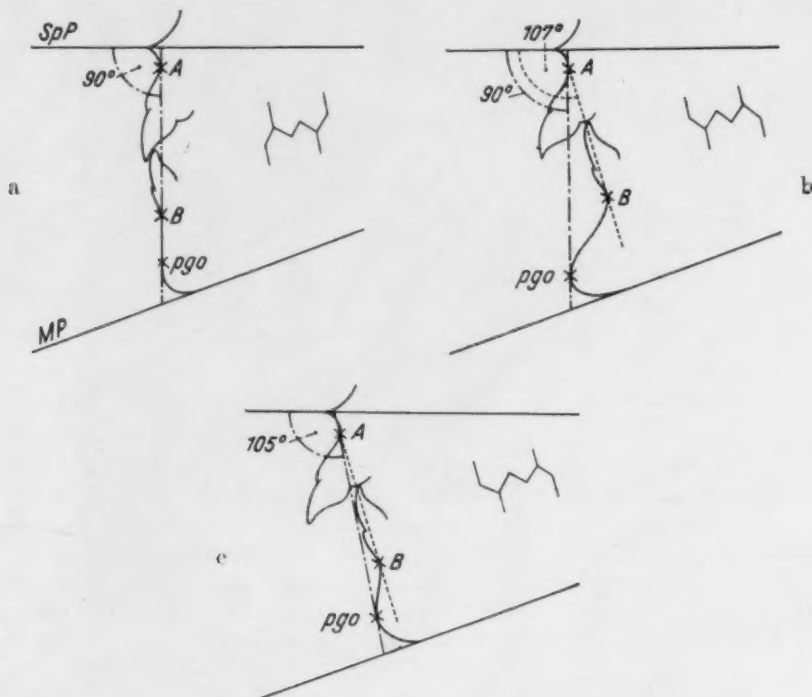


Fig. 20. Class II, Division 1 malocclusions of the alveolar and gnathic types.

a, Average relation of the jaws. The *A-B-pgo* line is perpendicular to the *SpP* plane, forming a maxillomandibular angle of 90 degrees.

b, Alveolar Class II malocclusion. As in *a*, the *pgo-A* line forms a maxillomandibular angle of 90 degrees; there is an average relation of the bodies of the jaws; the *A-B* line is enlarged to 107 degrees, indicating in this case a retrodisplaced lower alveolar bone which has caused the retroocclusion. (In other cases the malposed axes of the teeth only may cause the Class II malocclusion as in Fig. 16.)

c, Gnathic Class II malocclusion caused by a mandible that is retrodisplaced in relation to the maxilla. The maxillomandibular angle is enlarged (105 degrees). This relationship can be the result of a mandibular body that is short or reduced in length or a retrodisplaced mandibular body caused by a reduced gonial angle, a retrobent ramus, or an overly long maxilla. In all drawings the *B* angle has an average size of 20 degrees. An enlarged or reduced *B* angle influences the maxillomandibular angle (the relationship of the *B* angle is 10 degrees to about 7 degrees in the maxillomandibular angle). In such cases, therefore, the maxillomandibular angle must first be corrected if the true relationship of the jaws is to be obtained.

positions of subnasale and the chin coincide approximately with the vertical construction Pn , which is perpendicular to the NSe plane from the soft-tissue counterpart of nasion. Since this patient has a retroinclination of 8 degrees and a temporomandibular joint supraposition of 6 degrees, the "ought-to-be" profile slants markedly backward. The "ought-to-be" T angle is 10 degrees (average size of T angle) plus 8 degrees plus 6 degrees, or 24 degrees. The T angle is the angle formed by a line running from subnasale to pogonion as it intersects the Pn line (Fig. 2). In this case, there is a forward position of 8 degrees, showing that the middle face is protruding, in spite of an underdeveloped maxilla, as far as length is concerned. These readings prove that the cranio-metric relationship of jaw position and the gnathometric relationship of over- or underdeveloped jaws are essentially different considerations. As Fig. 21 shows, a maxilla that is too short can be combined with a forward position and a long

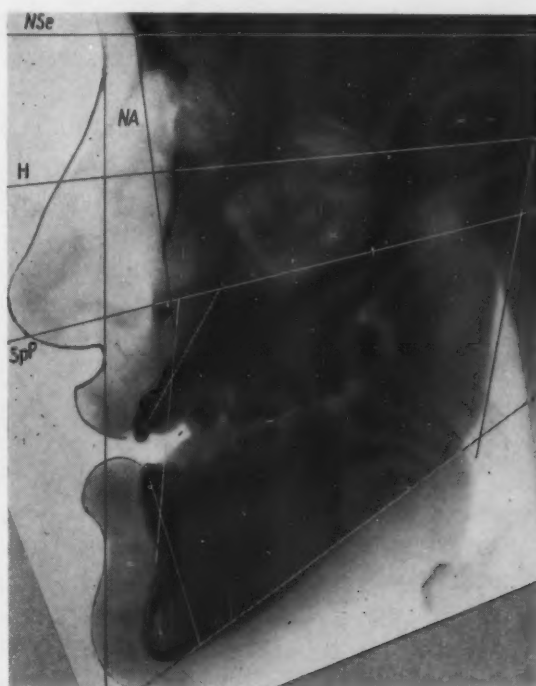


Fig. 21. Headplate taken in rest position showing true mandibular prognathism in an 18-year-old female patient. This is termed a gnathic Class III malocclusion. Height relations: $oi:ui = 2:2.6$ (average, 2:3); $om_i:um_i = 2:2$ (average, 2:3).

The height of the dentition as a whole compared to the skeletal nasal third, in spite of rest position, was 4.4:4 (average, 6:5); the anterior to posterior jaw height was 4:2.7 (average, 4:3 to 3:2), the B angle was 22 degrees.

Length relations ($N-Se$ distance = 67 mm.): corpus of mandible 82 mm. (average, 67 + 3 mm., or 70 mm.); ramus of mandible, 67 mm. (average, five-sevenths of corpus, or 50 mm.); upper jaw, 44 mm. (average, two-thirds of corpus of mandible, or 47 mm.); gonial angle, 138 degrees (average, 123 + 10 degrees).

It is concluded that this patient has a very long but low mandible as a whole, with a long but narrow ramus and an enlarged gonial angle.

mandible with a retroposition as well. Further information is available from a gnathometric measurement of cephalometric criteria. With a nasion-sella distance of 67 mm., the "ought-to-be" length of the mandibular body is 70 mm. Measurements show that it is actually well beyond this at 82 mm. The maxilla is only 44 mm. long instead of its "ought-to-be" length of 47 mm. The ramus is 67 mm. long, when the "ought-to-be" length is only 50 mm. The gonial angle is 137 degrees instead of the average of 123 degrees. From these four significant measurements—a shortened maxilla, an excessively long mandible, an excessively long mandibular ramus, and an enlarged gonial angle—a resulting mandibular prognathism of high degree is created. Can any conclusion be drawn regarding the development of the mandible itself? Unfortunately, the diameter of the cross-section of the chin is not clear in the illustration. It is only 8 mm. across, instead of the 11 to 12 mm. seen in the average case. The ratio of the height of the mandible in the molar region to the height of the maxilla is 1:1 instead of 3:2, showing a markedly low body, and the slender ramus is only 25 mm. broad instead of 33 mm., the average ratio of length of the body to the breadth of the ramus being 5:2.

We learn from this extreme case that the prognathic mandible is not at all overdeveloped, as a whole, but that it is actually deficient in height and substance. Perhaps this deficiency is a compensatory response to the excessive mandibular body length.

In the case just described (Fig. 21) a protrusion of the upper incisors also is present, but not to a sufficient degree to prevent the anterior cross-bite. This gnathic type of Class III malocclusion, in which the upper incisors are not retruded despite the fact that there is a mostly underdeveloped maxilla and an abnormally long mandible, is dramatically different from the well-known alveolar type of Class III malocclusion (also called a pseudo-Class III). A deciding symptom of the pseudo-Class III malocclusion is the presence of upright or retruded maxillary incisors, quite similar to the incisors seen in a Class II, Division 2 malocclusion. Proof of this biologic kinship is the fact that both Class II, Division 2 and Class III malocclusions occur in the genealogic tree of the same family (Korkhaus). In pseudo-Class III malocclusion, or the alveolar type of prognathism, the mandible is normally developed, and there is usually a normal interocclusal clearance and a normal mandibular rest position. The lingually inclined maxillary incisors compel the mandible to assume an anterior displacement as the result of the tooth guidance. Response to treatment is dramatic.

It is suggested that the pseudo-Class III malocclusion, in which the retruded maxillary incisors create an alveolar type of Class III malocclusion, be called Class III, Division 2, analogous to the Angle Class II, Division 2 malocclusion. The true Class III or gnathic type, in which the maxillary incisors are not retruded and may even be protruded and in which there is a long mandible, may be referred to as Class III, Division 1, analogous to the Angle Class II, Division 1 malocclusion.

Generally speaking, while a pseudo-Class III malocclusion, or a Class III,

Division 2 malocclusion, may exist over an entire lifetime, the morphologic characteristics of the gnathic Class III malocclusion do not materialize. The genuine prognathism comes only if there is a hereditary predisposition toward an excessive mandibular body length.

The last consideration is the thickness of the soft tissues, an essential requisite for determining the profile curve. The average thickness of soft tissue in various areas of the profile is shown in Fig. 22. The contours of the profile in relation to the vertical *Pn* line and the size of the angle formed by the subnasale-pogonion-*Pn* line (*T* angle) are influenced especially by a thicker subnasale. All other circumstances that cause a difference between the "ought-to-be" size and the actual size of the *T* angle must be determined by the gnathometric analysis.



Fig. 22. The thickness of the soft tissues covering the lower face (when the target-film distance is 2 meters.) The distance from subnasale (*sn*) to point *A* is taken horizontally. This distance is 12 mm. in children and 14 to 16 mm. in adults. The upper lip is 12 mm., the lower lip is 12 mm., the average chin cushion is 10 mm., and the soft-tissue thickness at gnathion is 6 mm.

SUMMARY

In this relatively brief résumé of my extensive study of roentgenostatics, I have tried to demonstrate the insight into many orthodontic problems that is supplied by the headplate. With some of the diagnostic criteria that I have developed, more precise information concerning orthodontic therapy is available. Gnathometry has proved to be the most important part of the headplate analysis, and I believe that it will play the leading role in the future. It completes and often corrects previous diagnostic impressions derived from examination of the patients, casts, and dental radiographs. Used properly, it makes available valuable guides for treatment and an exact cosmetic prognosis. The greatest advantage of gnathometry is the examination of the dentition itself, independent of craniometric considerations. Fundamental errors in interpretation must occur if the details of malocclusion are related to outside cranio-

metric reference lines or points. An example of this is the measurement of the axial inclination or position of the maxillary incisors in relation to the horizontal Frankfort plane or to the nasion-sella plane. Consideration of the individual jaw inclination and the temporomandibular joint position must be made before malpositions of the teeth in the dentition itself are measured and interpreted. Some techniques which ignore this fundamental consideration also disregard the individual natural skull architecture. Faulty interpretations are made which even decades of clinical experience will not prevent. Particularly in Class II, Division 1 and Class III malocclusions, in bimaxillary protrusions, and in problems involving the extraction of premolars, the cephalometric head-plate has proved essential at the time for decision.

A major challenge still confronts the orthodontist. He must know to what extent he can influence the morphologic symptoms of a malformation with the therapeutic measures that he has under his control. Cephalometrics will undoubtedly help him delineate the limits of his endeavors.

REFERENCES

1. Björk, A.: *The Face in Profile*, Lund, 1947, Berlingska Boktryckeriet.
2. Björk, A.: Cephalometric X-ray Investigations in Dentistry, *Internat. D. J.* 4: 718, 1954.
3. Björk, A.: Facial Growth in Man, Studied With the Aid of Metallic Implants, *Acta odont. scandinav.* 13: 9, 1955.
4. Broadbent B. H.: A New X-ray Technique and Its Application to Orthodontia. *Angle Orthodontist* 1: 45, 1931.
5. Broadbent, B. H.: Ontogenic Development of Occlusion, *Angle Orthodontist* 11: 223, 1941.
6. De Coster, L.: Une nouvelle ligne de référence pour l'analyse des téléradiographies sagittales in Orthodontie. *Rev. stomatol.* 11-12: 937, 1951.
7. Downs, W. B.: The Role of Cephalometrics in Orthodontic Case Analysis and Diagnosis, *AM. J. ORTHODONTICS* 38: 162, 1952.
8. Dreyfus, S.: Die morphologische Diagnostik in der Orthodontie, *Fortschr. Orthodont.* 1933.
9. Graber, T. M.: A Critical Review of Clinical Cephalometrics, *AM. J. ORTHODONTICS* 40: 1, 1954.
10. Hausser, E.: Schädelaufbau bei anatomisch korrekter Okklusion, *Fortschr. Kieferorthopädie*, vol. 17, 1956.
11. Hausser, E.: Weichteilprofil und knöchernes Profil bei anatomisch korrekter Okklusion, *Fortschr. Kieferorthopädie*, vol. 16, 1955.
12. Hoffer, O.: L'interprétation du téléradiogramme à l'aide du radiogramme crâniofacial en orthopédie maxillo-faciale, *Soc. franç. d'orthopédie dento-faciale*, vol. 25, 1954.
13. Hofrath, H.: Die Bedeutung der Röntgenfern- und Abstandsaufnahme für die Diagnostik der kieferanomalien, *Fortschr. Orthodont.* 1: 232, 1931.
14. Hotz, R.: *Orthodontie in der täglichen Praxis*, Bern, 1954, Hans Huber.
15. Korkhaus, G.: Erbmasse und Umwelt im Aufbau des Gesichtsschädels, *Fortschr. Kieferorthopädie*, vol. 13, 1952.
16. Korkhaus, G.: Über den Aufbau des Gesichtsschädels beim Deckbiss, *Fortschr. Kieferorthopädie*, vol. 14, 1953.
17. Korkhaus, G.: Biomechanische Gebiss- und Kieferorthopädie (Orthodontie). In von Christian Bruhn (editor): *handbuch der Zahnheilkunde*, München, 1939, J. F. Bergmann, vol. 4.

18. Korkhaus, G.: Die Feststellung der dento-maxillo-fazialen Veränderungen bei der Distalbissbehandlung im Fernröntgenbild, *österr. Ztschr. Stomatol.*, vol. 18, 1957.
19. Korkhaus, G.: Present Orthodontic Thought in Germany, *AM. J. ORTHODONTICS* 45: 881, 1959.
20. Korkhaus, G., and Neumann, D.: Über die Beteiligung von Oberkiefer und Unterkiefer bei der Progenie, *Fortschr. Kieferorthopädie*, vol. 18, 1957.
21. Krogman, W. M., and Sassouni, V.: A Syllabus in Roentgenographic Cephalometry, Philadelphia, 1957, Philadelphia Center for Research in Child Growth.
22. Moorrees, C. F. A.: Normal Variation and Its Bearing on the Use of Cephalometric Radiographs in Orthodontic Diagnosis, *AM. J. ORTHODONTICS* 39: 942, 1953.
23. Moorrees, C. F. A., and Kean, M. R.: Die natürliche Kopfhaltung und ihre grundlegende Bedeutung für die Beurteilung zephalometrischer Röntgenaufnahmen, *Fortschr. Kieferorthopädie*, vol. 20, 1959.
24. Neumann, D.: Der differentialdiagnostische Wert der Fernröntgenaufnahme bei der oberen Protrusion, *Deutsche Ztschr. Zahn.*, vol. 25, 1955.
25. Neumann, D.: Die fernröntgenologische Auswertung der Grösse und Lage des Oberkiefers, *Fortschr. Kieferorthopädie*, vol. 18, 1957.
26. Schaeffer, A.: Behaviour of the Axis of Human Incisor Teeth During Growth, *Angle Orthodontist* 19: 254, 1949.
27. Schmuth, G.: Zur kosmetischen Prognose bei kieferorthopädischen Massnahmen, *Ztschr. Stomatol.*, vol. 18, 1955.
28. Schmuth, G.: Kephalemtrische Befunde bei schiefen Rückgesichtern, *Ztschr. Stomatol.*, vol. 54, 1957.
29. Schmuth, G., and Tiegelkamp, K. H.: Kephalemtrische Untersuchungen zur Beurteilung der Entwicklung des Oberkiefers in sagittaler Richtung, *Deutsches Zahnärzteblatt*, heft 4, 1957.
30. Schwarz, A. M.: Gebisswinkel und Profil, *Deutsche Zahn-, Mund-, u. Kieferh.* 2: 487, 1935.
31. Schwarz, A. M.: Das Röntgenbild im Dienste der Gebissregelung, *Ztschr. Stomatol.* 34: 513, 1936.
32. Schwarz, A. M.: *Lehrgang der Gebissregelung*, ed. 3, Vienna, 1961, Urban & Schwarzenberg.
33. Schwarz, A. M.: *Wie der angehende Kieferorthopäde Gesicht und Schädel verstehen lernt*, Vienna, 1955, Urban & Schwarzenberg.
34. Schwarz, A. M.: Der Deckbiss (Steilbiss) im Fernröntgenbild, *Fortschr. Kieferorthopädie*, vol. 17, heft 2-4, 1956.
35. Schwarz, A. M.: Der Knickbiss, *Fortschr. Kieferorthopädie*, vol. 18, heft 2, 1957.
36. Schwarz, A. M.: Die falschen Bisslagen im Fernröntgenbild, *Ztschr. Stomatol.*, vol. 56, 1958.
37. Simon, P. W.: *Grundzüge einer systematischen Diagnostik der Gebissanomalien*, Berlin, 1922, Hermann Meusser.

A qualitative roentgenographic evaluation of root length in hypothyroid patients

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ONE of the most common hazards of orthodontic treatment which plagues both orthodontist and patient and lowers the general practitioner's opinion of our specialty, is the phenomenon known as root resorption. I believe that all orthodontists who routinely take after-treatment roentgenograms have had the unpleasant experience of reviewing a result which is beautiful in function, displays healthy oral tissues, and is most pleasing esthetically, only to find that the root areas of the teeth have been dramatically reduced. We have all been faced with the unpleasant duty of informing a worried parent of the presence of this condition, the reasons for its occurrence and the prognosis for the future of the child's dentition.¹⁵ This is not a simple task, since few orthodontic concepts are more controversial in nature than those regarding the incidence^{18, 20} and predisposing factors associated with root resorption.

This phenomenon has been studied from many different aspects. Some investigators have studied root resorption in laboratory animals, and others have worked with groups of orthodontic patients. The literature contains many articles on this subject, and no orthodontic textbook is complete without a short chapter describing root resorption and its etiology.¹⁶ However, the only causes upon which most investigators seem to agree are pressure (such as that caused by impacted teeth or developing cysts) and trauma that is severe enough to devitalize or fracture a tooth.

Many other factors, more controversial in nature, have been suggested and investigated. These include diet,² acute or chronic disease, age of patient,⁵ sex

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of patient, duration of orthodontic treatment, type of appliance used in treatment,^{4, 6, 11} type and direction⁹ of force, endocrinopathies,^{3, 7, 8, 10, 13, 14, 21} inflammatory processes, and genetic factors. For each study which seems to point the finger of suspicion at any of these factors, there is another study which says that no evidence can be found to support such a conclusion. Since 1929, when an article by Ketcham began to stimulate interest in this problem, even the incidence of root resorption reported in the various articles has shown tremendous variation, regardless of whether the patients reported were under orthodontic treatment, had completed orthodontic treatment, or represented an untreated control.

One of the contributory causes of root resorption mentioned most frequently since the publication of Becks' first article on the subject in 1936³ has been endocrinopathy, particularly hypothyroidism. If hypothyroidism should actually leave the dentition in an unusually vulnerable state, perhaps orthodontists have an obligation to go to somewhat greater lengths to determine the presence or absence of this condition before instituting orthodontic treatment. If hypothyroidism is found to be present, steps should be taken to bring it under control before orthodontic treatment is begun.

In my own practice, when wrist films have shown delayed bone age or when other factors have led me to suspect hypothyroidism, I have referred the patient to his or her physician for an examination and a protein-bound iodine determination. More often than not, the results have been negative. In a few cases, however, hypothyroidism has been found to exist and suitable therapy has been instituted by the physician. In these cases orthodontic treatment was instituted and carried through to completion without any unusual degree of root resorption. In several other cases in which hypothyroidism was unsuspected before treatment but in which resorption was unusually severe, I again referred the patient to a physician for examination and thyroid evaluation. Here, again, the results varied; in some cases the protein-bound iodine level was low and therapy was instituted, and in about an equal number of cases the tests were negative. These conflicting responses did nothing to clarify the picture for me, and I began to wonder what we would find if we took the reverse approach to the problem. In other words, if we were to examine a group of known hypothyroid patients at various age levels, would we find a greater incidence or degree of resorption than we would find in a control group of normal patients of about the same age?

Consequently, I set about trying to gather as large a group of known hypothyroid patients as possible for my test group. The assistance of the Endocrine Clinic at the University of California and Stanford University Hospitals was secured. The sample from these two sources was small, since only about one out of ten hypothyroid patients of record at these institutions was found to fit all the qualifications. Therefore, I enlisted the cooperation of many private physicians in San Mateo County.

After studying Werner's¹⁹ text entitled *The Thyroid*, I decided to use the protein-bound iodine determination and the basal metabolic rate as criteria in

selecting patients for the study. The serum cholesterol test appears to have been fairly well discarded as being too nonspecific for thyroid function. In the case of the basal metabolic rate, it is possible to have false highs and false lows, although false highs are much more likely. The low range of normal in this test is generally considered to be -7 per cent, although it may vary somewhat with age, sex, and body type. The protein-bound iodine test is generally considered to be the most accurate of these three tests, although it also can give false highs in pregnant women and patients with infectious hepatitis and acute thyroiditis, as well as when the diet is unusually high in iodine-containing foods. The protein-bound iodine test can show false lows in patients with nephrosis, cirrhosis of the liver, psychiatric disorders, long-standing Addison's disease, pituitary failures, and pneumonia and in persons who have recently undergone surgical operations. The normal range for the protein-bound iodine determination is generally considered to be 4.0 to 8.0 meg. per cent per 100 c.c. However, this range may vary slightly in different laboratories.

Patients were considered suitable for the study if they showed a protein-bound iodine level of less than 3.5 meg. per cent per 100 c.c. or a basal metabolic rate of less than -17 per cent and if they had one or more of the classic symptoms of hypothyroidism. These symptoms include apathy, weakness, muscle cramps, weight gain, constipation, menorrhagia, dry hair, puffy skin, intolerance to cold, etc.

The acceptable test values were set low in an attempt to eliminate the borderline cases, on the assumption that this might make the results more clear-cut one way or the other. In addition, all patients whose low test values followed surgical treatment or radioactive iodine therapy were eliminated, since I wanted only patients whose low thyroid function had been uncontrolled for at least several years.

No patients who were edentulous or who had a history of orthodontic treatment were accepted. The youngest patient accepted for the sample was 11 years of age, since I felt that root development had to be complete if resorption was to be evaluated.

Roentgenograms were then obtained of the upper and lower central and lateral incisors of those patients who had the necessary qualifications and who were willing to cooperate in this study. The upper and lower anterior teeth were selected since, in clinical practice, resorption seems to be evident more frequently and to a greater degree in these teeth than in any others. Therefore, I felt it safe to assume that the first evidence of resorption would be likely to appear in these regions.

The roentgenograms were examined with a three-power magnifying glass and a suitable source of illumination. Each tooth was rated according to the standards set up by Malone in 1951 and used by Massler and Perreault¹⁷ in 1954. This classification is as follows:

- 0 = No evidence of resorption
- ? = Questionable resorption; root outline intact but minute areas of spotty resorption or periodontal membrane widened in periapical area

- 1+ = Apex blunted and resorbed for 1 to 2 mm.
 2+ = Apex blunted and resorbed for 2 to 4 mm.
 3+ = Apex blunted and resorbed for 4 mm. to one-half of root
 4+ = More than one-half the root resorbed
 5 = Related to infection, trauma, etc.

I found it desirable to add one other classification:

L = Lateral resorption of greater degree than “?”

These teeth were rated in the most objective manner possible. No conscious attempt has been made to prove anything. Rather, the study attempted simply to discover whether or not a hypothyroid condition leaves the dentition more vulnerable to root resorption. If hypothyroidism is truly a condition which predisposes a patient to root resorption, then I think we can safely assume that there would be some significant increase in the incidence or degree of resorption seen in the roentgenograms of this test group as compared with that seen in a similar group of so-called normal patients (“normal,” that is, in the sense of absence of hypothyroidism).

Table I. *Test group*

<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>
0	89	22.47
?	79	19.96
1+	209	52.78
2+	14	3.53
3+	1	0.25
4+	1	0.25
L	3	0.76
5	11	2.81
Total	396 + 11 injured	100 + 2.81 injured
Total number of patients	55	
Total number of teeth examined	396	
Total number of teeth missing	49	

Table II. *Control group*

<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>
0	141	32.71
?	52	12.06
1+	232	53.59
2+	4	0.93
3+	0	0
4+	0	0
L	2	0.46
5	4	0.93
Total	431 + 4 injured	100 + 0.93 injured
Total number of patients	55	
Total number of teeth examined	431	
Total number of teeth missing	9	

Table III. *Ages 11 to 20*

<i>Test group*</i>			<i>Control group†</i>		
<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>	<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>
0	32	36.41	0	60	57.69
?	28	31.82	?	20	19.23
1+	20	22.75	1+	24	23.08
2+	3	3.41	2+	0	0
3+	1	1.14	3+	0	0
4+	1	1.14	4+	0	0
L	3	3.41	L	0	0
5	1	1.14	5	0	0
Total	88 + 1	100 + 1.14	Total	104	100.00
<i>*Test group:</i>			<i>†Control group:</i>		
Number of patients		11	Number of patients		13
Number of teeth examined		88	Number of teeth examined		104
Number of teeth missing		0	Number of teeth missing		0

A large group of patients selected at random from the practice of a local general practitioner who takes roentgenograms of high quality served as a control. All patients in whom any vague possibility of hypothyroidism existed were eliminated. The remaining group was then reduced at random to a size comparable to that of the test group, and an attempt was made to keep the groups similar with respect to age and sex. Roentgenograms of the patients thus selected were then examined in the same manner and rated according to the same classification as roentgenograms of the test group.

The results observed are shown in Tables I to VIII. Whenever a patient's age is listed, it indicates the age at the time roentgenograms were taken. In

Table IV. *Ages 21 to 30*

<i>Test group*</i>			<i>Control group†</i>		
<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>	<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>
0	18	29.50	0	30	37.98
?	20	32.79	?	12	15.19
1+	21	34.43	1+	35	44.30
2+	2	3.28	2+	2	2.53
3+	0	0	3+	0	0
4+	0	0	4+	0	0
L	0	0	L	0	0
5	1	1.64	5	0	0
Total	61 + 1	100 + 1.64	Total	79	100.00
<i>*Test group:</i>			<i>†Control group:</i>		
Number of patients		9	Number of patients		10
Number of teeth examined		61	Number of teeth examined		79
Number of teeth missing		11	Number of teeth missing		1

Table V. Ages 31 to 40

Test group*			Control group†		
Classification	Number of teeth	Percentage	Classification	Number of teeth	Percentage
0	15	17.24	0	26	32.50
1	15	17.24	1	14	17.50
1+	57	65.52	1+	40	50.00
2+	0	0	2+	0	0
3+	0	0	3+	0	0
4+	0	0	4+	0	0
L	0	0	L	0	0
5	3	3.45	5	0	0
Total	87 + 3	100 + 3.45	Total	80	100.00

*Test group:

Number of patients 12
Number of teeth examined 87
Number of teeth missing 9

†Control group:

Number of patients 10
Number of teeth examined 80
Number of teeth missing 0

Table VI. Ages 41 to 50

Test group*			Control group†		
Classification	Number of teeth	Percentage	Classification	Number of teeth	Percentage
0	15	15.96	0	16	15.79
1	6	6.38	1	5	5.26
1+	71	75.53	1+	72	76.84
2+	2	2.13	2+	0	0
3+	0	0	3+	0	0
4+	0	0	4+	0	0
L	0	0	L	2	2.11
5	3	3.19	5	2	2.11
Total	94 + 3	100 + 3.19	Total	95 + 2	100 + 2.11

*Test group:

Number of patients 13
Number of teeth examined 94
Number of teeth missing 10

†Control group:

Number of patients 12
Number of teeth examined 95
Number of teeth missing 1

some cases the totals in these tables exceed 100 per cent, as all injured teeth are listed in category 5 and also are rated according to degree of resorption.

The results have been correlated by over-all totals and have been broken down according to age groups as well. I had planned also to treat the figures according to the protein-bound iodine and basal metabolism rate test results, but I discarded this idea quickly when it became apparent that the degree and incidence of resorption bore only a random relationship to these test figures.

SUMMARY

This roentgenographic evaluation of the incidence and degree of root resorption in a group of fifty-five hypothyroid patients was stimulated by studies

Table VII. *Ages 51 to 60*

<i>Test group*</i>			<i>Control group†</i>		
<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>	<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>
0	9	14.52	0	8	13.79
?	10	16.13	?	2	3.45
1+	36	58.06	1+	48	82.76
2+	7	11.29	2+	0	0
3+	0	0	3+	0	0
4+	0	0	4+	0	0
L	0	0	L	0	0
5	3	4.84	5	0	0
Total	62 + 3	100 + 4.84	Total	58	100
<i>*Test group:</i>			<i>†Control group:</i>		
Number of patients		9	Number of patients		8
Number of teeth examined		62	Number of teeth examined		58
Number of teeth missing		10	Number of teeth missing		6

reported by Becks^{3, 8, 10} in 1936, 1939, and 1942. Since the publication of these articles, much weight has been given to the role played by endocrinopathies, particularly hypothyroidism, in the predisposition of patients to root resorption. Becks reported certain statistical results which showed that a startlingly high proportion of patients with root resorption also were afflicted with hypothyroidism.

Table VIII. *Ages 61 to 70*

<i>Test group*</i>			<i>Control group†</i>		
<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>	<i>Classification</i>	<i>Number of teeth</i>	<i>Percentage</i>
0	0	0	0	0	0
?	0	0	?	2	13.33
1+	4	100	1+	12	80.00
2+	0	0	2+	1	6.67
3+	0	0	3+	0	0
4+	0	0	4+	0	0
L	0	0	L	0	0
5	0	0	5	0	0
Total	4	100	Total	15	100
<i>*Test group:</i>			<i>†Control group:</i>		
Number of patients		1	Number of patients		2
Number of teeth examined		4	Number of teeth examined		15
Number of teeth missing		4	Number of teeth missing		1

In my private practice, whenever I have suspected that a patient might have thyroid difficulties, tests have been performed by the patient's physician. In some cases my suspicions have been aroused by delayed dentition, by retarded bone age as evidenced by wrist films, or by the presence of an unusual

amount of root resorption during or after orthodontic treatment. The results of these tests have been negative more often than not. The incidence of thyroid problems in those cases in my practice in which patients have been so tested has not been as high as that reported by Becks, but it has been high enough that I would not discard completely the idea that thyroid function may have some bearing on the problem of root resorption.

I gradually began to wonder whether an approach from the opposite direction would throw any additional light on this subject. Consequently, a group of fifty-five hypothyroid patients was gathered from the Stanford University and University of California Hospitals and from the private practices of many physicians in San Mateo County. These patients satisfied the following requirements:

1. They had a basal metabolic rate of -17 per cent or below or a protein-bound iodine level of 3.5 meg. per cent per 100 c.c. or below, and they showed one or more of the classic symptoms of hypothyroidism.
2. Their hypothyroidism was not the result of surgery or radioactive iodine therapy, so that we could be fairly certain that the condition had been present in an uncontrolled state for several years.
3. Anterior teeth were present.
4. There was no history of orthodontic treatment.
5. Root development of the anterior teeth was complete.

Roentgenograms of the anterior teeth of these patients were then obtained and evaluated. Tables were constructed from the raw data, comparing each classification in the test group with the same classification in the control group on a percentage basis. These comparisons were made for the total groups and were also broken down according to decades of age. An attempt to analyze the results according to increasing severity of hypothyroidism as indicated by test results was quickly abandoned when only a random relation was observed.

A control group of fifty-five patients was obtained from the private practice of a local general practitioner. Roentgenograms of the anterior teeth of these patients were evaluated and classified in the same manner as were those of the control group.

The percentages obtained in the test and control groups were surprisingly similar when the groups were treated as a whole. In the test group 22.47 per cent showed no resorption whereas in the control group 32.71 per cent showed no resorption. In the test group 19.96 per cent showed questionable resorption, as compared with only 12.06 per cent in the control group. If the "no resorption" and "questionable resorption" groups are combined, which I consider a valid way to treat the data since in the "questionable" group the resorption often could not be seen with the naked eye, then the test group shows a total of 42.43 per cent, as compared to 44.77 per cent in the control group. In the 1+ category where resorption of 1 to 2 mm. exists, the test group shows 52.78 per cent against 53.59 per cent for the control group. In the 2+ category, where

2 to 4 mm. of resorption exists, the test group shows 3.53 per cent as against 0.93 per cent for the control group. In this category, however, as in categories 3+ and 4+, we are discussing extremely small numbers of teeth.

This sample may be criticized because of the relatively small number of patients involved. However, in view of the low test results that patients had to have to qualify for this sample, which represent a rather severe degree of hypothyroidism, I believe that we would certainly be justified in expecting a much more dramatic difference between the two groups in the incidence and degree of resorption than was shown in this study if hypothyroidism were a decisive factor.

When the data are treated according to decades of age we are dealing with much smaller numbers of teeth, and less confidence can be placed in the results. However, there does appear to be a generally increasing incidence of resorption with increasing age.

CONCLUSIONS

1. Root resorption is one of the most commonly encountered hazards of orthodontic treatment.

2. The predisposing factors that make the patient more vulnerable to this condition are the subject of much controversy.

3. The incidence of root resorption, both in the general population and in orthodontically treated patients, is not unanimously agreed upon.

4. Endocrinopathies, particularly hypothyroidism, have been suspected by some to be among the most common predisposing factors.

5. My study of a group of fifty-five hypothyroid patients and fifty-five normal patients, none of whom have ever had orthodontic treatment, leaves serious doubt in my mind as to the validity of the concept that hypothyroidism alone makes the dentition more vulnerable to root resorption.

REFERENCES

1. Ketcham, Albert H.: A Progress Report of an Investigation of Apical Root Resorption of Vital Permanent Teeth, *INT. J. ORTHODONTIA* 15: 310-318, 1929.
2. Marshall, J. A.: Relation of Malnutrition to Dental Pathology, *INT. J. ORTHODONTIA* 17: 527, 1931.
3. Becks, Hermann: Root Resorptions and Their Relation to Pathologic Bone Formation. Part I, *INT. J. ORTHODONTIA* 22: 445-477, 1936.
4. Oppenheim, Albin: Root Resorption, *Angle Orthodontist* 6: 82, 1936.
5. Rudolph, C. E.: A Comparative Study in Root Resorption in Permanent Teeth, *J. Am. Dent. A.* 28: 822, 1936.
6. Stuteville, O. H.: Injuries to the Teeth and Supporting Structures Caused by Various Orthodontic Appliances, and Methods of Preventing These Injuries, *J. Am. Dent. A.* 24: 494, 1937.
7. Carman, J.: Arrested Root Absorption During Orthodontic Treatment, *INT. J. ORTHODONTIA* 23: 35-37, 1937.
8. Becks, Hermann: Orthodontic Prognosis: Evaluation of Routine Dento-Medical Examinations to Determine Good and Poor Risks, *AM. J. ORTHODONTICS & ORAL SURG.* 25: 610, 1939.

9. Hemley, Samuel: The Incidence of Root Resorption of Vital Permanent Teeth, *J. D. Res.* 20: 133, 1941.
10. Becks, Hermann, and Cowden, R. C.: Root Resorptions and Their Relation to Pathologic Bone Formation, *AM. J. ORTHODONTICS & ORAL SURG.* 28: 513-526, 1942.
11. Gottlieb, B.: Some Histologic Facts Useful in Orthodontic Practice, *AM. J. ORTHODONTICS & ORAL SURG.* 28: 167-172, 1942.
12. Engel, M. B., Bronstein, I. P., Brodie, A. G., and Wesoke, P.: Roentgenographic Cephalometric Appraisal of Untreated and Treated Hypothyroidism, *Angle Orthodontist* 18: 37-38, 1948.
13. Cross, Sidney: Endocrines: Their Relation to Orthodontic Diagnosis and Treatment Planning, *AM. J. ORTHODONTICS* 34: 418-440, 1948.
14. Tager, B. N.: Endocrine Problems in Orthodontics, *AM. J. ORTHODONTICS* 37: 867-875, 1951.
15. Jacobson, Oscar: Clinical Significance of Root Resorption, *AM. J. ORTHODONTICS* 38: 687-696, 1952.
16. Fisher, Bercu: Hazards of Treatment. In *Textbook of Orthodontics*, Philadelphia, 1952, W. B. Saunders Company, chap. 1, pp. 1-5.
17. Massler, Maury, and Perreault, J. G.: Root Resorption in the Permanent Teeth of Young Adults, *J. Dent. Children* 21: 158-164, 1954.
18. Massler, Maury, and Malone, Anthony: Root Resorption in Human Permanent Teeth; a Roentgenographic Study, *AM. J. ORTHODONTICS* 40: 619-633, 1954.
19. Werner, Sidney C.: *The Thyroid*, New York, 1955, Paul B. Hoeber, Inc.
20. Phillips, John: Apical Root Resorption Under Orthodontic Therapy, *Angle Orthodontist* 25: 1-2, 1955.
21. Kerr, D. A.: Oral Manifestations of Endocrine and Nutritional Deficiencies, *J. D. Med.* 11: 199-205, 1956.
22. Miller, B. G.: Investigation of the Influence of Vascularity and Innervation on Tooth Resorption and Eruption, *J. D. Res.* 36: 669-676, 1957.

Malfunction of the tongue

Part II. The abnormal swallowing habit: its causes, effects, and results in relation to orthodontic treatment and speech therapy

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DURING growth of the mandible certain changes occur in the mandibular plane angle as a result of pressure of the tongue between the teeth during abnormal swallowing over a period of years. The greatest change takes place in the so-

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called open-bite cases, in which the bite is opened from the first or second molar on one side to the same tooth on the opposite side. In these cases the mandible appears to be literally bent by the position of the tongue between the teeth. This either affects the mandible at gonion, displaces the head of the

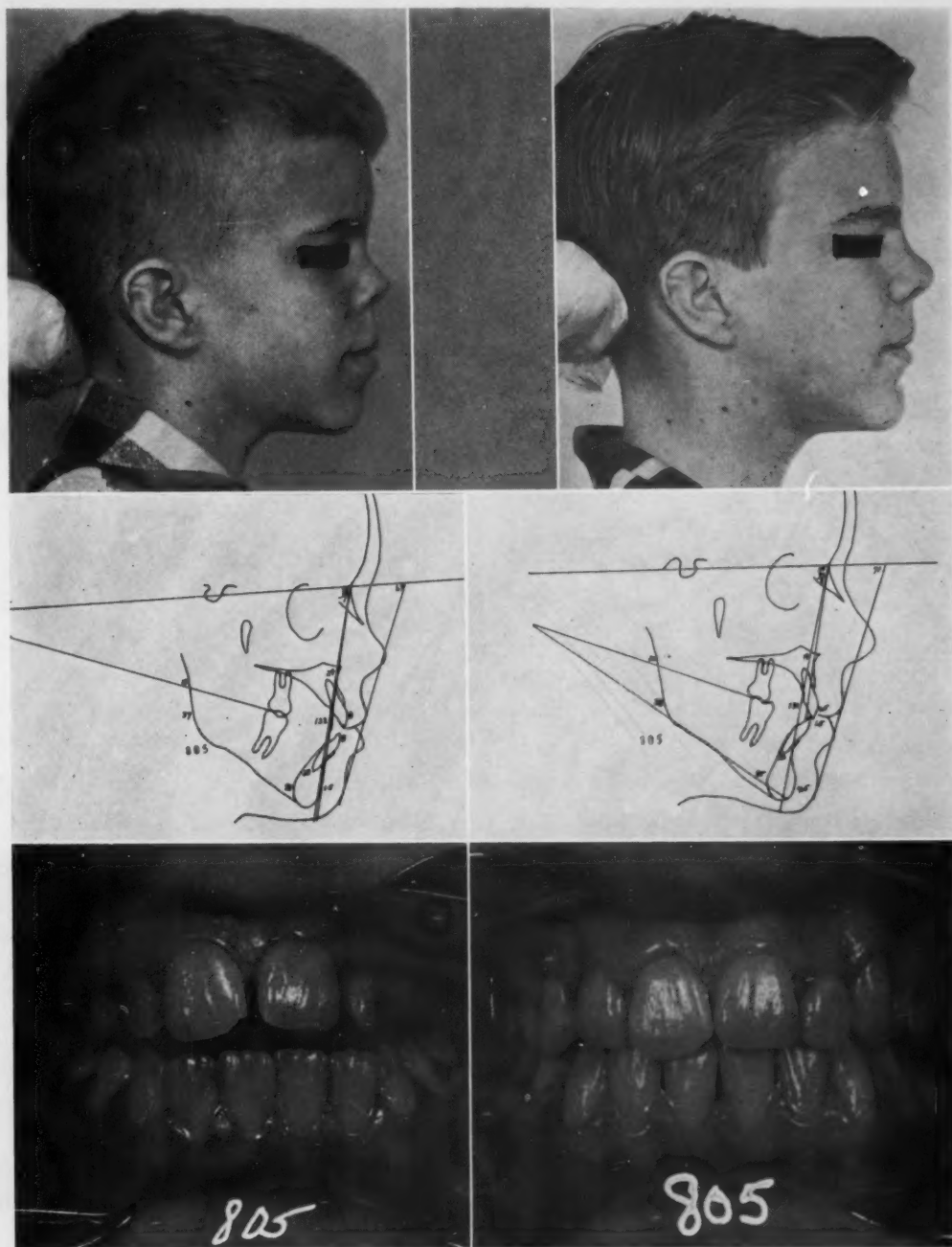


Fig. 1. Patient J. S. Photographs and cephalometric tracings before and after treatment. Note complete open-bite and mandibular plane angle of 37 degrees before treatment.

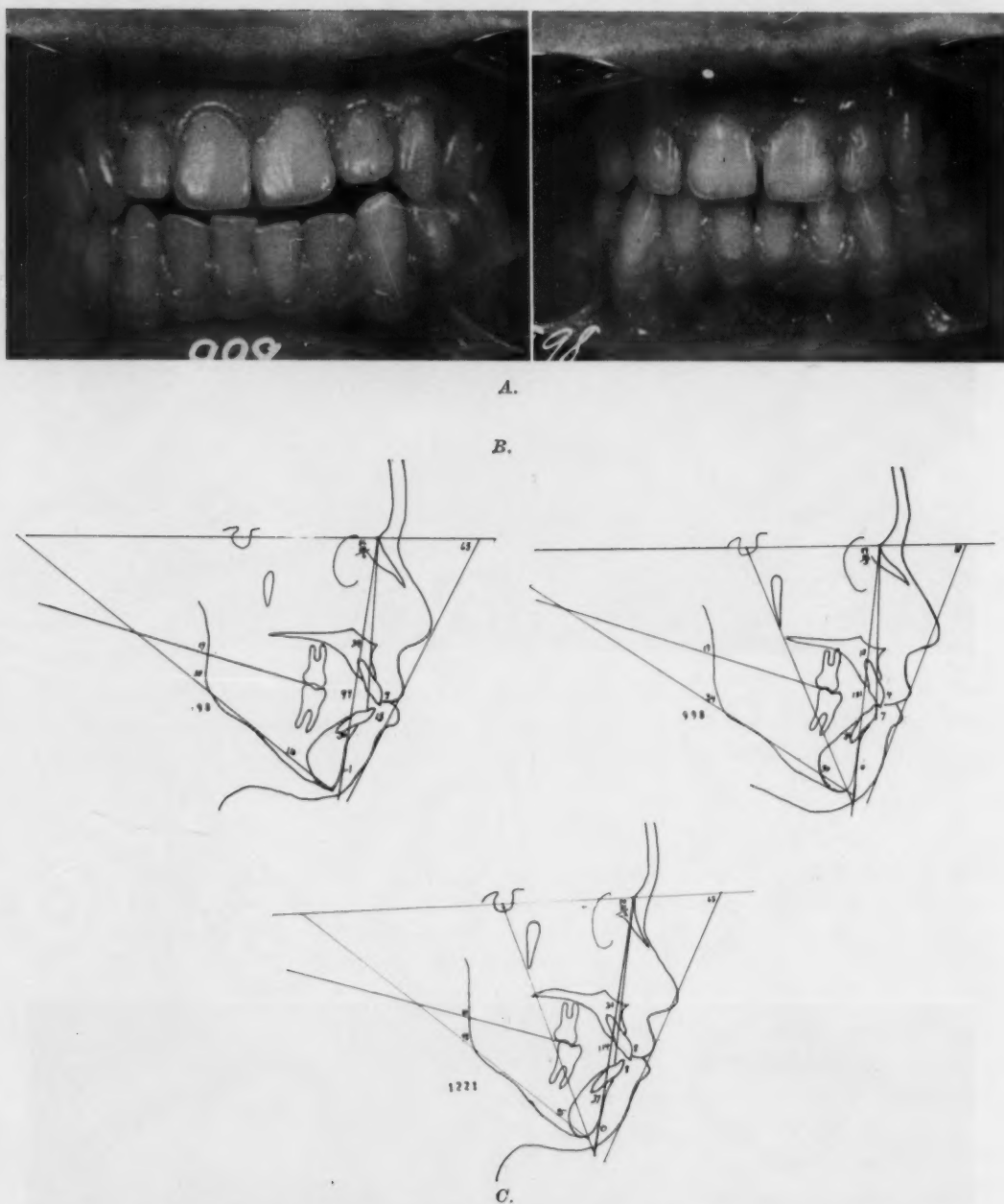


Fig. 2. *A* and *B*, Patient R. M. Intraoral photographs and cephalometric tracings before and after habit training and orthodontic treatment. Note open-bite and mandibular plane angle of 38 degrees before treatment. *C*, Sister of Patient R. M., with same tongue habit. Note same anterior tooth position and same bony pattern.

condyle, or affects the length of the ramus or rami. With the tongue held between the teeth and the added pressure of the muscles of deglutition against it, we may assume that mandibular growth may be altered and that this causes some of our steepest mandibular plane angles. These are the changes seen in

many cases of open-bite and bimaxillary protrusion in which the teeth are pushed forward by constant tongue action.

The photographs and cephalometric tracings shown in Figs. 1 to 5 illustrate what constant pressure can do to the shape of the mandible, the alveolus, the dental structure, and the position of the anterior and posterior teeth as well as the changes that take place as a result of habit correction and orthodontic treatment.

The abnormal swallowing habit is definitely one of the causes of some of our severe Class III malocclusions. For many years I have hesitated to go on record as implicating the abnormal swallowing habit in the etiology of Class III

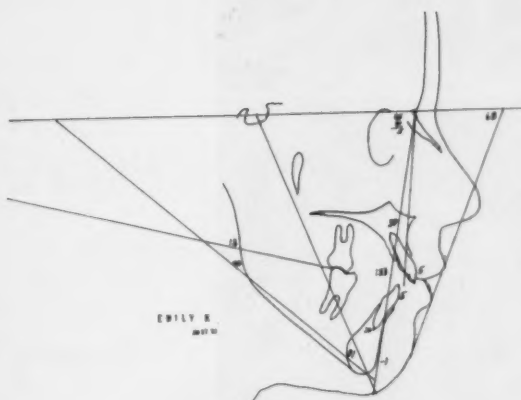


Fig. 3.

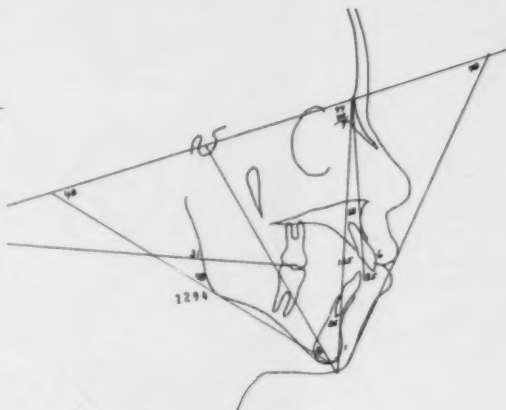


Fig. 4.

Fig. 3. Patient E. K. Cephalometric tracing showing open-bite and steep mandibular plane angle of 40 degrees.

Fig. 4. Patient B. P. Cephalometric tracing showing mandibular plane angle of 48 degrees.

malocclusion. However, an understanding of the mechanics involved in abnormal swallowing and the observation of complete collapse of the buccal and anterior segments in cases of complete cross-bite with blocked-out upper canines and lateral incisors have made the relationship between abnormal swallowing and Class III malocclusion apparent to many others who have followed this problem closely. Orthodontists in the Phoenix and Tucson areas who have studied the causes of this malocclusion believe that there is a definite correlation between abnormal swallowing and Class III malocclusion. Abnormal swallowing causes a complete collapse of the maxilla, and adverse growth of the mandible is caused by the masticating pressure of a complete cross-bite on the upper jaw. Many a child who has never learned to swallow properly has never put his tongue against his palate; as a result, the palate is so narrow that it is mechanically impossible to place the tongue against it. Also, in Class III malocclusion the tongue is usually enlarged as a result of the position in which it is placed in abnormal swallowing.

Fig. 6 shows another example of a severe Class III malocclusion with the typical short ramus and a steep mandibular plane angle. This patient placed the tongue on the occlusal surfaces of all the lower teeth and then closed the teeth against it. The irritation caused by this abnormal use actually widened the

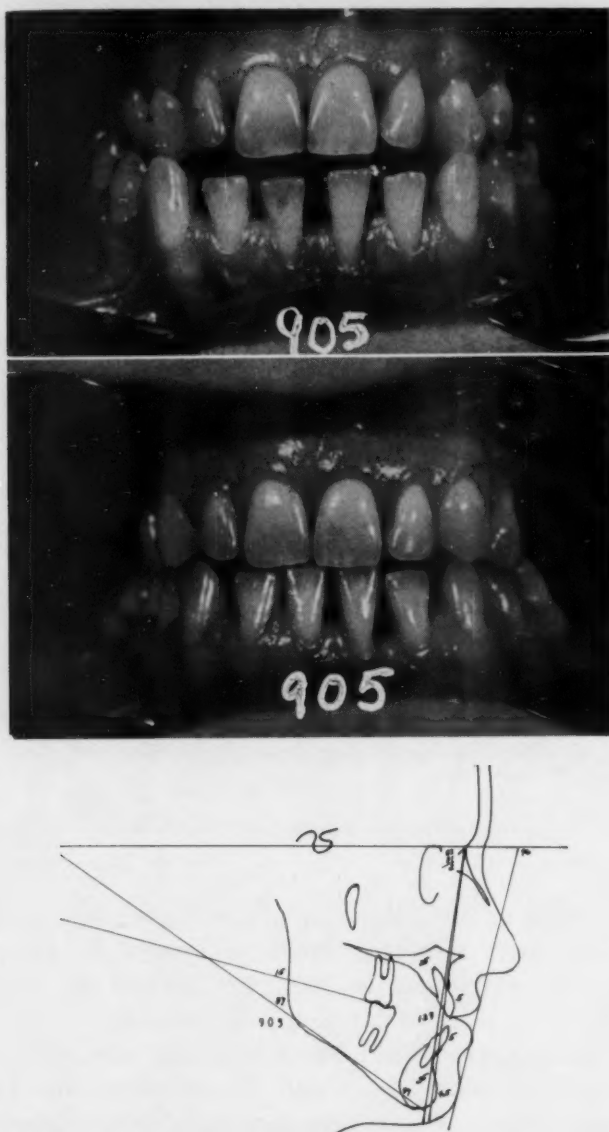


Fig. 5. Patient A. S., aged 33 years. Note complete open-bite and mandibular plane angle of 37 degrees.

Fig. 6. *A* and *B*, Patient G. N. Mandibular plane angle of 40 degrees before treatment and 45 degrees after treatment. Class III malocclusion with steep mandibular plane angle of 45 degrees is due in part to abnormal swallowing habit. Note change in position of anterior teeth after treatment. Note also, in before-treatment intraoral photograph, that upper maxilla is in complete cross-bite, with upper right canine blocked out, upper left lateral incisor in contact with premolar, and upper left canine impacted and high over lateral incisor. *C*, Another example of a Class III malocclusion caused by abnormal swallowing.

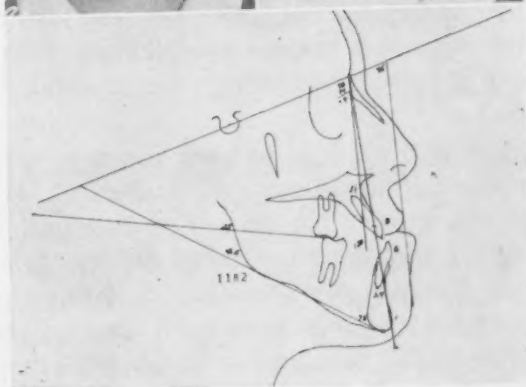
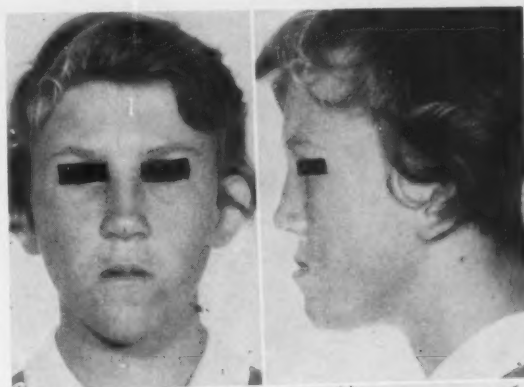
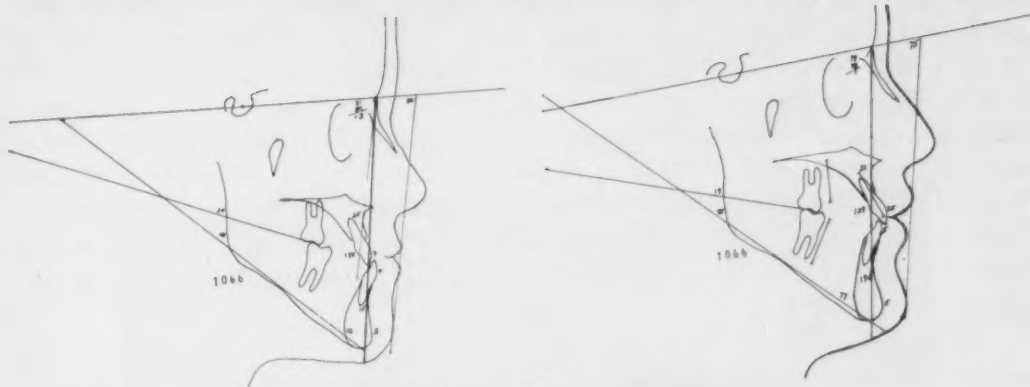
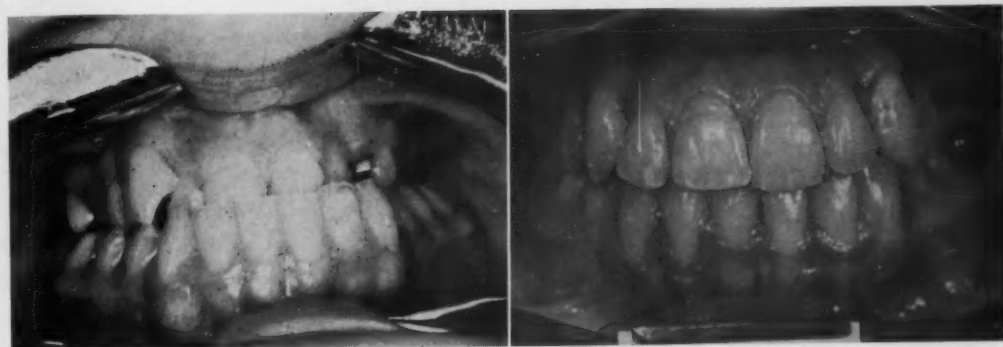


Fig. 6. (For legend, see opposite page.)

tongue and made it larger. Upon completion of habit therapy and correction of the total cross-bite and the Class III malocclusion, the tongue returned to a more nearly normal size and it was possible for the patient to place the tongue properly against the palate between the confines of the teeth in normal deglutition.

As I have previously pointed out,¹ the old-fashioned nipple, such as the one shown in Fig. 7, is the principal cause of abnormal swallowing. This nipple is so long that it reaches almost to the back of the throat, making it impossible for the infant to put the tongue against the roof of the mouth, even if he wanted to. To make matters worse, the mother usually places extra holes in the end of the nipple to make sure that the milk will flow freely. This, in itself, changes the mechanics of swallowing. To keep from drowning, the infant very quickly learns to suck and to swallow with the tip of the tongue between the gum pads and with the tongue troughed to receive the flow of milk. This tongue action also takes place in infants whose mothers have so much milk that the slightest pressure on the breast causes the milk to flow. To date, after a period of seventeen years, I have seen eight breast-fed children whose mothers told of having had a tremendous amount of milk which would flow freely without any sucking on the child's part. These children had the same problem as the child subjected to improper bottle feeding.

In 1960 I described a nipple that will help to eliminate this problem.¹ It is possible to spoil any nipple by punching several holes in it to allow milk to flow too freely, thus causing the child to become an abnormal swallower.

It is strange how difficult it is to get a child started on a feeding program. Some children have a very strong sucking urge at birth and, much to my surprise, some have a complete sucking urge. I have had one patient whose sucking urge was completely absent, so that the child had to be fed with an eye dropper. I mentioned this during a panel discussion before a group of speech therapists, and the pediatrician on the panel informed me that he has seen several children who were born without the sucking urge. Thus, nipples should vary, as far as the flow of milk is concerned. In order for a newborn infant to get his full supply of milk without tiring before he finishes his formula, two holes probably should be placed in the nipple. Later, when the sucking urge is stronger, the nipple should be replaced by one that has only one hole in it, thus making it necessary for the child to suck harder. I suspect that the use of such nipples would eliminate many of our abnormal swallowing problems and, with them, many of our orthodontic problems.

It is surprising how difficult it is to teach others to adopt proper nursing methods, once other customs have been well established. At our local hospital I supplied nipples of this type to the nursery and to the physicians in charge. Much to our surprise, the first thing the nurses did was to place many holes in the nipples to facilitate the easy flow of milk, thus defeating the purpose of the nipples. In other words, the nipples were now the same type as those used before except for the shape, which did simulate the shape of the breast.

The pacifier seems to be coming back into vogue. There is a great difference between sucking the thumb, the fingers, or some foreign object and sucking a

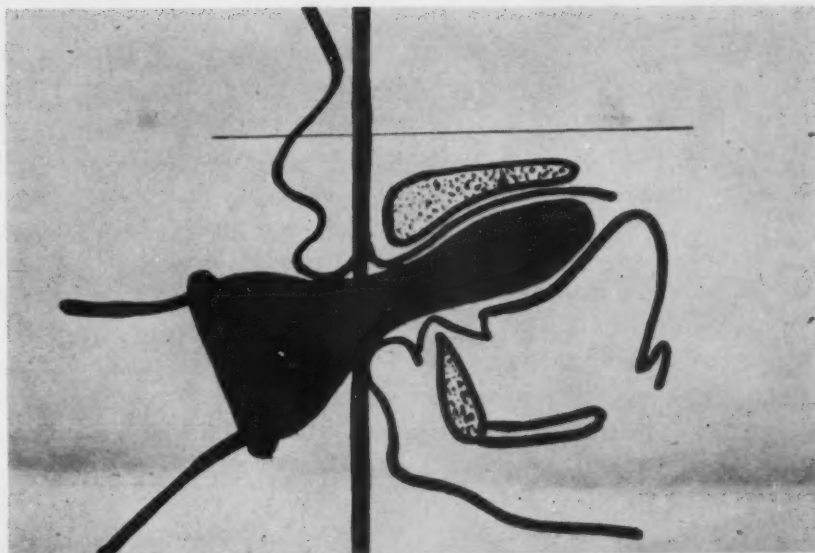


Fig. 7.

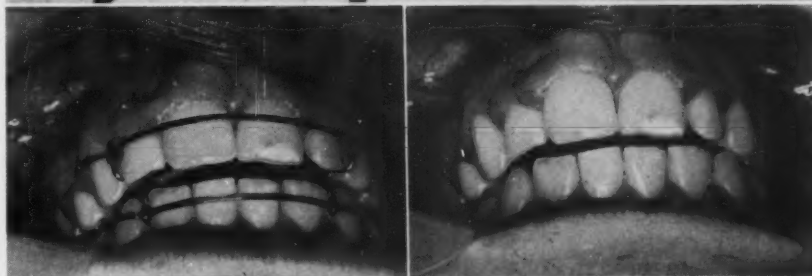


Fig. 8.

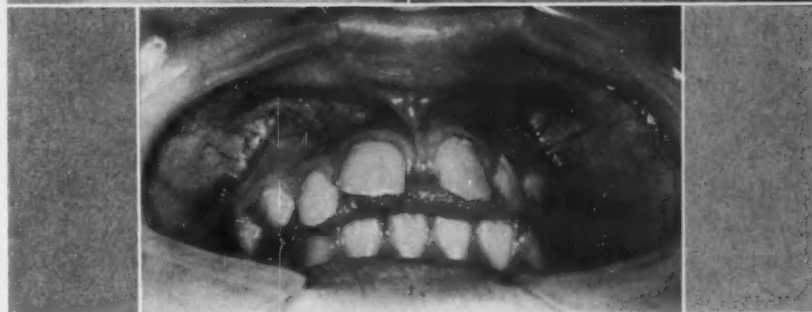


Fig. 9.

Fig. 7. Old-fashioned nipple which is principal cause of abnormal swallowing. Note great length of this nipple, which reaches almost to back of child's throat.

Fig. 8. Patient S. S. This patient has an abnormal swallowing habit and a tongue-thrust. *Left*, With retainer; *right*, without retainer.

Fig. 9. Patient W. T. Treatment was discontinued because of patient's failure to cooperate. Note position of tongue.

pacifier which more nearly resembles the human breast in contour. As we all know, Nature places an infant's mouth and mandible in a very retruded position at birth in order that he may nurse properly at the breast. Unlike the thumb or fingers, the pacifier has a flat object in front with which the infant can form a seal with his lips. He has to thrust his jaw forward in order to suck properly on the pacifier, and in many cases this will help to develop the mandible.

Fig. 8 shows the dentition of a girl who had an abnormal swallowing habit and a tongue-thrust. This patient was treated solely by orthodontic methods; no habit control was used. As the photographs show, there is a tendency toward an open-bite, and the upper teeth are still slightly protruded to accommodate the tongue. It is difficult to treat such cases to the normal anterior closure, and relapse usually occurs if they are treated to the normal incisal closure.

Fig. 9 shows a case in which treatment was discontinued because of the patient's failure to cooperate in practicing her habit lessons. The orthodontist is advised not to treat such cases unless the patients will make the effort to learn to swallow properly.

It is important to note that although tongue-thrust does protrude the upper anterior teeth, there are many cases (for example, those involving open-bite) in which the tongue in retraction has a tendency to pull the lower anterior teeth

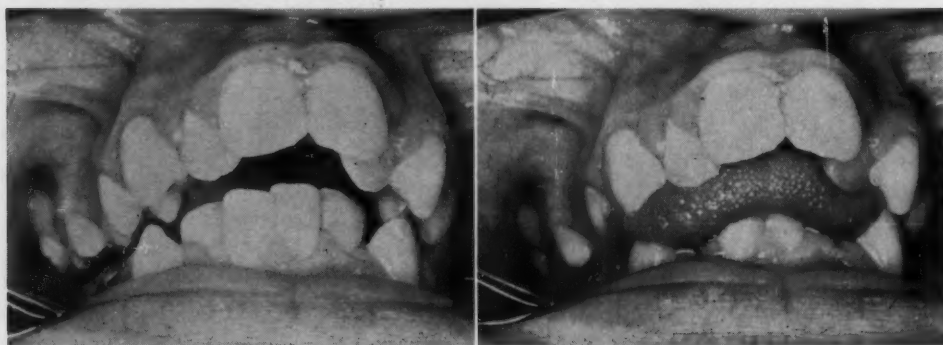


Fig. 10. Tongue pulling lower incisors lingually at completion of the swallowing act.

lingually into a collapsed and retruded position (Fig. 10). As Strang has pointed out, "A denture in malocclusion is in complete muscular balance."

Failure to correct inherent muscular activity is one of the most important causes of orthodontic failure. *These could well be called our functional malocclusions.*

In order to bring some semblance of order to the chaotic descriptions of patients with abnormal swallowing habits, we have attempted to classify these cases in four distinct groups.

Group 1.—In most cases of the first group there is a diastema between the upper central incisors. Figs. 11, 12, and 13 show shining examples of cases in which tongue-thrust has affected the anterior segment. The tongue action may be a little bit different in these cases, and there are many variations of the tongue in these classifications.

Group 2.—In the second group of cases a nonocclusion or open-bite is seen not only between the anterior teeth but in the posterior teeth as well—usually from the first molar forward or, if the second molars are in place, from the second molar forward. Formerly, these were considered the most difficult cases to treat. However, with the advent of habit therapy and correction of the abnormal swallowing habit, these cases respond faster than most cases in which

patients have normal swallowing patterns and severe malocclusions. First of all, once the habit is removed and the pressure no longer exists, it is easier to close a complete open-bite with the aid of vertical elastics and a chin strap. We do not know whether we are actually depressing the posterior molars, extruding the anterior teeth, doing both, or changing the shape of the mandible. Only a series of headfilms from about fifty cases will show whether we are (1) changing the mandible, repositioning the head of the condyle, or thinning the meniscus, (2) depressing the molars, or (3) changing the mandibular angle at gonion and actually bending the mandible. It seems sensible to believe that the main body of the mandible and alveolus can be changed by orthodontic means when this headgear is used. In my office the results obtained in open-bite cases that were once considered untreatable tend to bear this out. Some of these cases show a complete open-bite, often from the second molar forward. In many cases the



Fig. 11. Patient P. L. Note diastema between upper central incisors as result of tongue-thrust. *A*, Before treatment. *B*, Tongue in place. *C*, At conclusion of habit therapy and first period of orthodontic treatment.

Fig. 12.

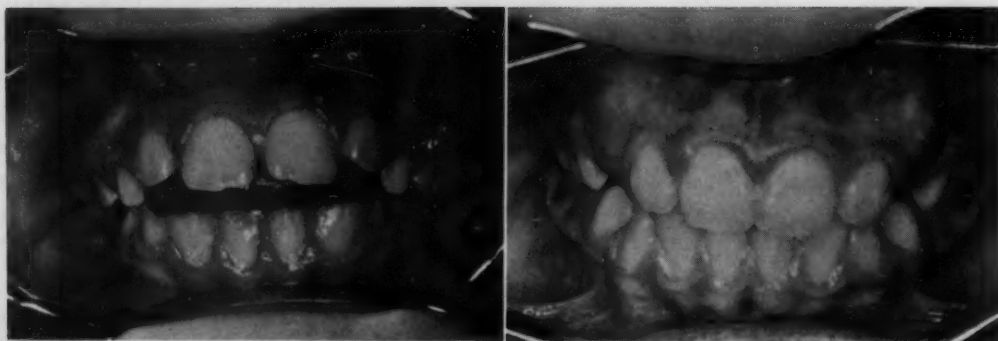


Fig. 13.

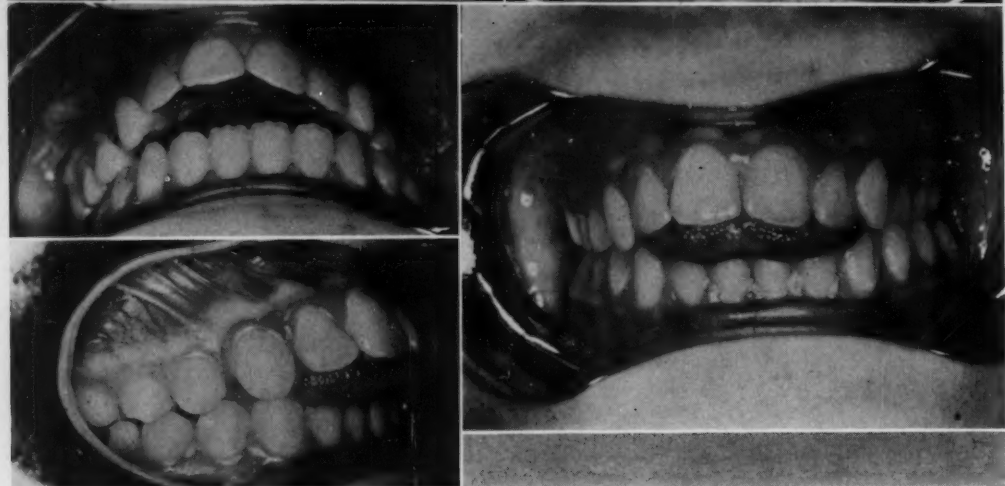


Fig. 12. Patient D. V. Intraoral photographs before and after treatment and wearing of an upper working retainer.

Fig. 13. Patient M. B. Photographs illustrating effects of tongue-thrust.

child not only thrusts the tongue between the teeth but also puts it on the occlusal surface of the teeth and closes the teeth against it. After being thus bitten for several years, the tongue becomes quite large.

Fig. 1 shows a good example of this type of case. The patient has a mandibular plane angle of 34 degrees with practically a complete cross-bite and open-bite from first molar to first molar. Figs. 14 to 17 also illustrate this phenomenon. Patient D. M. (Fig. 17) received orthodontic therapy with a complete banding technique and then had a complete relapse. This case shows exactly what happens when the bands and retainers are removed and no provision is made for correction of the abnormal swallowing habit.

In the case of Patient J. N. the bite has been closed in the posterior region. Fig. 18 shows the method used in closing this patient's bite. All orthodontists are familiar with these cases in which relapse occurs faster than in other orthodontic cases. Such cases have been problems to the general dentist for many, many years. In the past the dentist ground off the occlusal surfaces of the upper and lower posterior teeth, closing the bite sometimes as much as $\frac{1}{4}$ inch; six months later, as a result of the tongue habit, this bite would be open



Fig. 14.

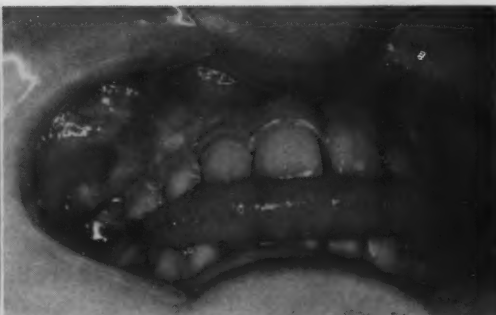


Fig. 15.



Fig. 16.



Fig. 14. Patient T. S. Tongue appears very large after patient has spent years biting it.

Fig. 15. Patient S. G. Note practically complete cross-bite and open-bite from first molar to first molar.

Fig. 16. Patient K. R. Another case in which cross-bite and open-bite have been caused by abnormal swallowing habit.

the same as before. These open-bite cases have been the downfall of many prosthodontists because they did not recognize the open-bite position of the teeth before extraction and, when the dentures were made, placed the teeth in good occlusion. Many have found that these patients, in attempting to swallow, have dislodged their upper denture. When dental prostheses are made for patients who have passed the age of 60, it is wise to create a space for the tongue so that the patients may continue to swallow abnormally. I know a dentist who prevailed upon a 65-year-old patient to let him improve her bridge, which

another dentist had constructed with the teeth in an open-bite relation. The old bridge was removed and the incisor area was closed, leaving no room for the patient's tongue. Much to the dentist's surprise, the patient was uncomfortable and could not swallow and eat. Within three or four weeks, it became necessary to remove the bridge and remake it to allow the patient to swallow abnormally.

Fig. 17.

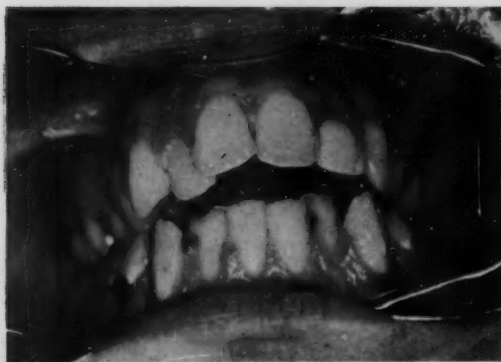


Fig. 18.

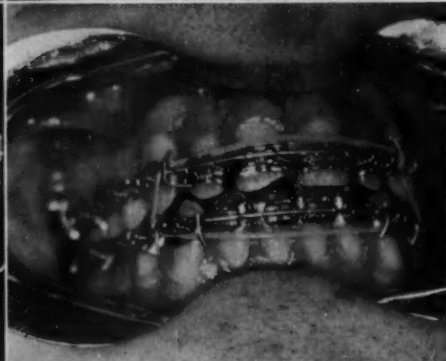


Fig. 17. Patient D. M. Complete relapse followed orthodontic treatment when no provision was made for correction of abnormal swallowing habit.

Fig. 18. Patient J. N. Photographs showing method used to close bite.

In the case of Patient A. S. (Fig. 5, A), an open-bite practically destroyed the occlusion and created a traumatic occlusion. The patient was referred to a periodontist, who was requested to treat the soft tissues and to see if the teeth

could be saved. The periodontist felt helpless, as he recognized the abnormal swallowing habit, and referred the patient to my office for habit therapy. Although this patient was 33 years of age, the habit was corrected and a full band hook-up was placed on her teeth to give her a fair occlusion at this age. The lower anterior teeth were very loose and had to be held while the bands were made. At the completion of treatment and following removal of the periodontally involved posterior teeth, this patient was able to masticate her food properly and to keep her remaining teeth in good condition.

Group 3.—The third type of abnormal swallowing is the side-thrust. In these cases a nonocclusion in the premolar and canine area has been created by the lateral displacement of the tongue. These so-called side-thrust cases are the most difficult to correct, and usually there is a recurrence of this type of swallowing in our completed open-bite cases. In our complete open-bite cases we may see a tendency for the bite to open slightly in the premolar area on either one or both sides. Examples of the conditions created by this side-thrust are shown in Figs. 19 to 22.

Group 4.—The fourth type of abnormal swallowing is seen in the so-called close-bite case. These cases are also more difficult to correct and are the most difficult to detect. In many of these cases the swallowing habit goes unsuspected until orthodontic treatment has been completed, and then the orthodontist is confused to find that the patient has an open-bite. He feels that the abnormal swallowing habit has been developed during treatment, which is not true. It takes a great deal of training before the operator can detect this type of abnormal swallowing, as the habit is easily disguised. The patient, although he has a severe close-bite, opens his mouth sufficiently (in extreme cases almost as much as an inch) to accommodate the tongue between the teeth when he swallows abnormally. Close-bite cases are shown in Figs. 23 to 26.

The case of Patient P. P. is of particular interest. The central incisors were unexposed and impacted and had to be exposed surgically so that bands could be placed on them. When this child closed his mouth, the lower anterior teeth hit on the palate; even in this condition, when the patient swallowed, he opened his mouth wide enough to enable him to place the tongue between the teeth.

This last group of cases is the reason we feel that the placing of any mechanical contrivance (such as a hayrake or a jig) in the mouth to keep the tongue from coming forward will end in failure. First of all, these children have a natural fence with their teeth closed. If they would keep the teeth closed tightly, in centric occlusion, they could not force the tongue between the anterior teeth and would not disturb the dentition. This is not the case, however, for these children open the mouth and swallow with the tongue between the teeth, and they do the same with an artificial appliance. Fig. 27 shows an intraoral photograph of Patient P. P. after completion of habit therapy and orthodontic treatment.

It is not easy to explain why abnormal swallowing affects some children. In some cases we feel that the tongue habit is not so severe; otherwise, it would have opened the bite the same as in the complete open-bite cases.

Fig. 19.

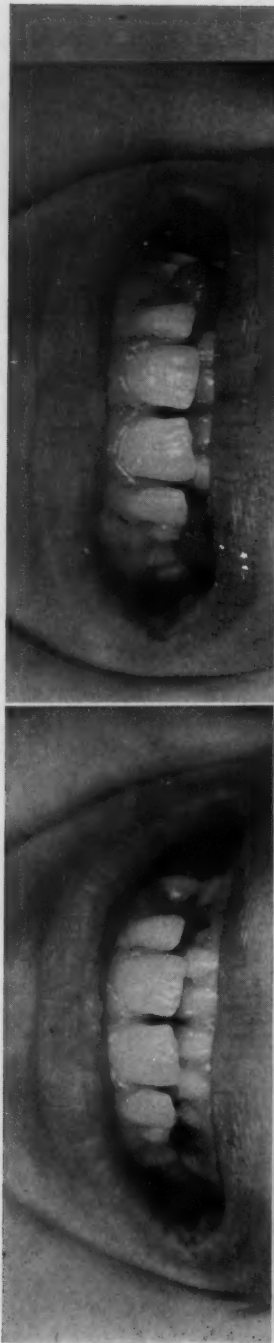


Fig. 20.

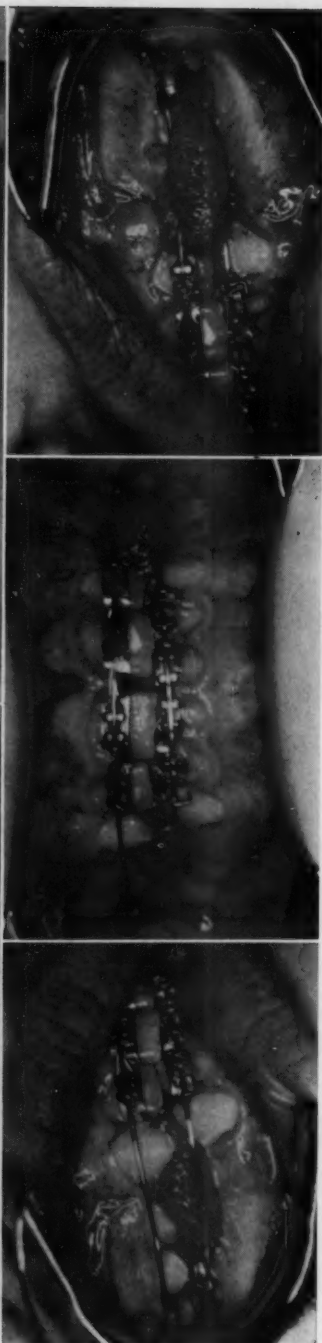


Fig. 19. Patient D. L. D. Nonocclusion in premolar and canine area thrust habit.

Fig. 20. Patient D. O. Malocclusion caused by lateral displacement of tongue in abnormal swallowing.

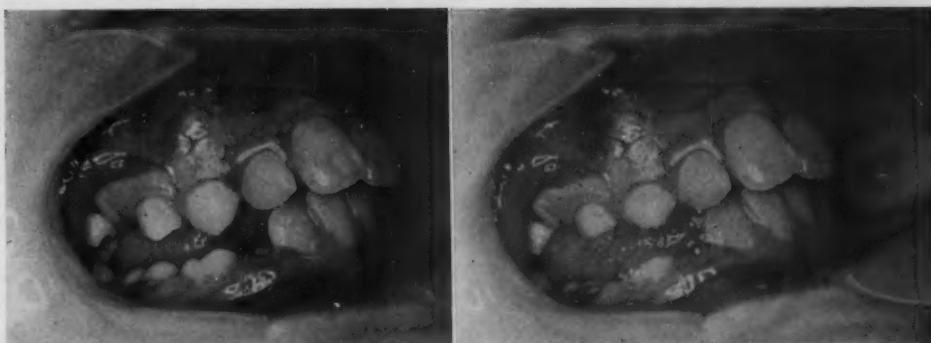


Fig. 21.

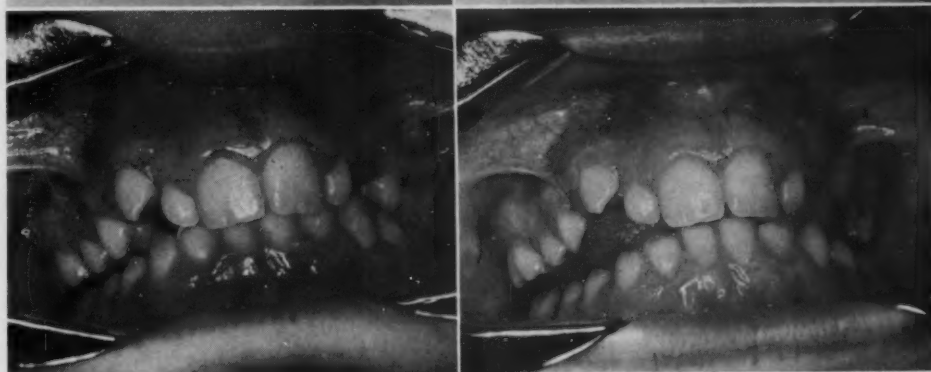


Fig. 22.



Fig. 23

Fig. 21. Patient R. Y. Another case in which side-thrust habit has resulted in open-bite in premolar and cuspid area.

Fig. 22. Patient E. D. Note malocclusion caused by side-thrust swallowing habit.

Fig. 23. Patient L. G. Note close-bite caused by abnormal swallowing habit.

Also, the tongue habit is countered by a leaning habit. The head constitutes, roughly speaking, one-fifth of the body weight; thus, if the child weighs 100 pounds, the head weighs about 20 pounds. Leaning on the chin, then, as many children do while studying and watching television, will have a tendency to depress the posterior teeth and cause the so-called close-bite in spite of the tongue habit. In orthodontic treatment we use very light pressure compared to the 20 pounds of pressure exerted by the child in leaning on the chin. Hence, one can readily see that in many of the cases in which orthodontic treatment has placed the teeth in a correct incisal edge relationship, the bite will be closed

Fig. 24.



Fig. 25.



Fig. 26.



Fig. 27.



Fig. 24. Patient D. C. Note close-bite produced by holding tongue between anterior teeth while swallowing.

Fig. 25. Patient T. P. Another case in which abnormal swallowing is present in a close-bite.

Fig. 26. Patient P. P. Unexposed impacted central incisors had to be exposed surgically so that bands could be placed on them.

Fig. 27. Patient P. P. Intraoral photograph following habit therapy and orthodontic treatment.

after several years of chin leaning. This supposition seems justified in these close-bite cases; therefore, I do not believe that a mechanical contrivance will work.

I think it is well to show a failure in a case that I treated some twenty years ago (Fig. 28). The cross-bite was corrected, as indicated in the before- and after-treatment photographs. The bite was closed, but even during retention it



Fig. 28. Patient A. S. before and after treatment of cross-bite caused by abnormal swallowing.

opened up in the anterior region. Nothing was done to correct the facial deformity caused by abnormal use of the orbicularis and mentalis muscles. The pencil mark on the lower anterior teeth shows the position in which the upper incisor edges were placed over the lower anterior teeth at the completion of treatment. Some years later when this patient was married, her mouth was in the position seen today, with an open-bite. This is one of the reasons that we started to think about some method to correct the abnormal swallowing habit in order to have our orthodontic treatment results remain stable.

Dr. Robert Gawley has come forth with a mechanical aid (Fig. 29) that may work when it is not possible to give therapy to correct an abnormal swallowing habit; I think this is one of the best mechanical means that I have seen to date. I sometimes recommend that this be used in extreme side-thrust cases. The latex rubbers are placed on the side and the patients are instructed, in the words of Dr. Gawley, that "when the tongue touches the elastic they are to realize that these elastics are supposedly charged with electricity and it will give them a shock, and every time that their tongue touches the elastic it is to remind them that their tongue is in an improper position." I think that this, with habit therapy for correction of side-thrust, will help to correct these cases faster. Figs. 30 and 31 show some cases in which the bite closed after correction with habit therapy alone. (In the case of Patient M. Y., shown in Fig. 31, a central incisor was fractured during the habit lessons.) Cases that remained stable after habit correction and orthodontic therapy are shown in Figs. 1, 2, and 12.

Fig. 29.

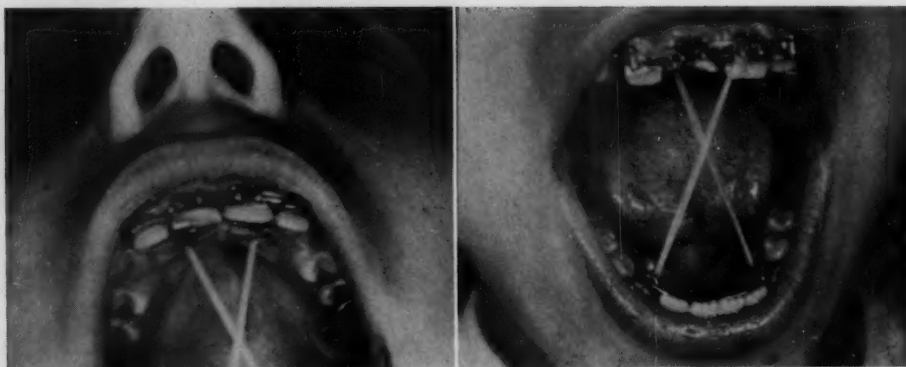


Fig. 30.

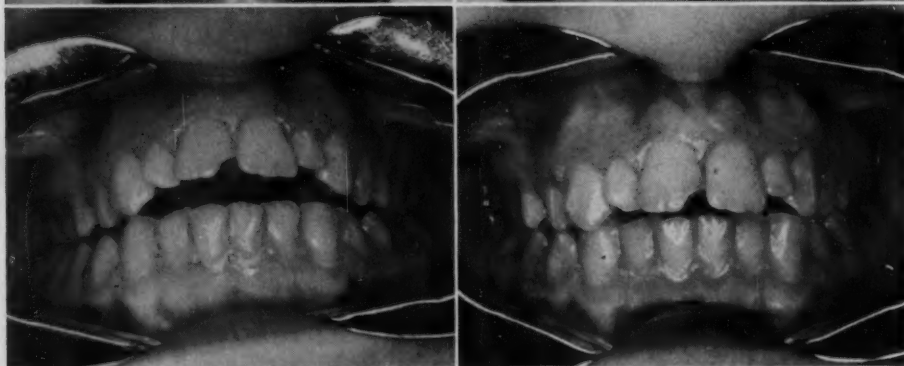


Fig. 31.



Fig. 29. Mechanical aid developed by Robert Gawley for use in correction of bad swallowing habits.

Fig. 30. Patient L. C. Photographs before and after habit therapy which resulted in closure of bite.

Fig. 31. Patient M. Y. Habit therapy alone brought about correction of this patient's malocclusion.

Other mechanical appliances are used by some orthodontists, and some of them will be shown here. Patient S. S. had worn the crib shown in Fig. 32, *B* on the upper lingual appliance to keep her tongue from coming forward. I do not recommend the use of such a crib, as it prevents the child from putting the tongue in the proper position in swallowing. I also do not believe in the use of cribs for correction of thumb-sucking, for the crib covers the palate and keeps



Fig. 32.



Fig. 33.

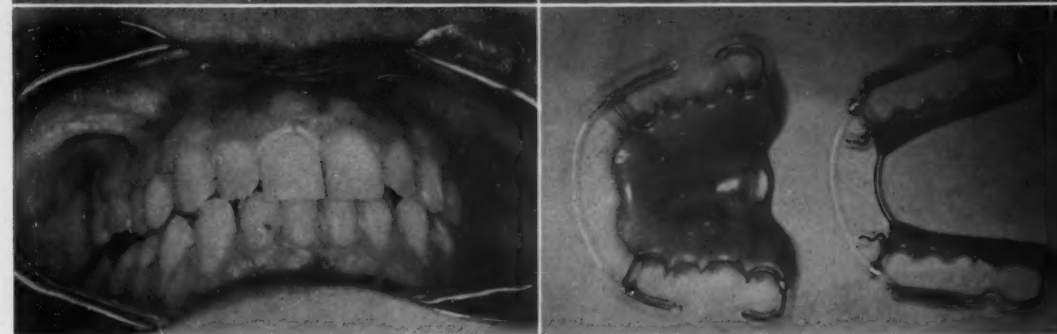


Fig. 32. Patient S. S. Photographs showing crib used to prevent tongue from going between teeth at night.

Fig. 33. Photographs before and after closure of spaces between anterior teeth in 42-year-old woman.

the tongue from being in its normal place for proper swallowing. In my office all mechanical appliances are removed from the child's mouth to allow the child to have a normal positioning of the tongue with correct habit therapy. For night swallowing the crib shown in Fig. 32, *C* and *D* was placed on the lower teeth. The crib was in the form of a partial plate with wires coming up over the tongue to keep it from going between the teeth. You can imagine how happy this child was when these mechanical gadgets were removed after six months



Fig. 34. Patient K. L. Note bimaxillary protrusion produced by abnormal swallowing habit in which both upper and lower teeth were pushed forward by tongue during deglutition.

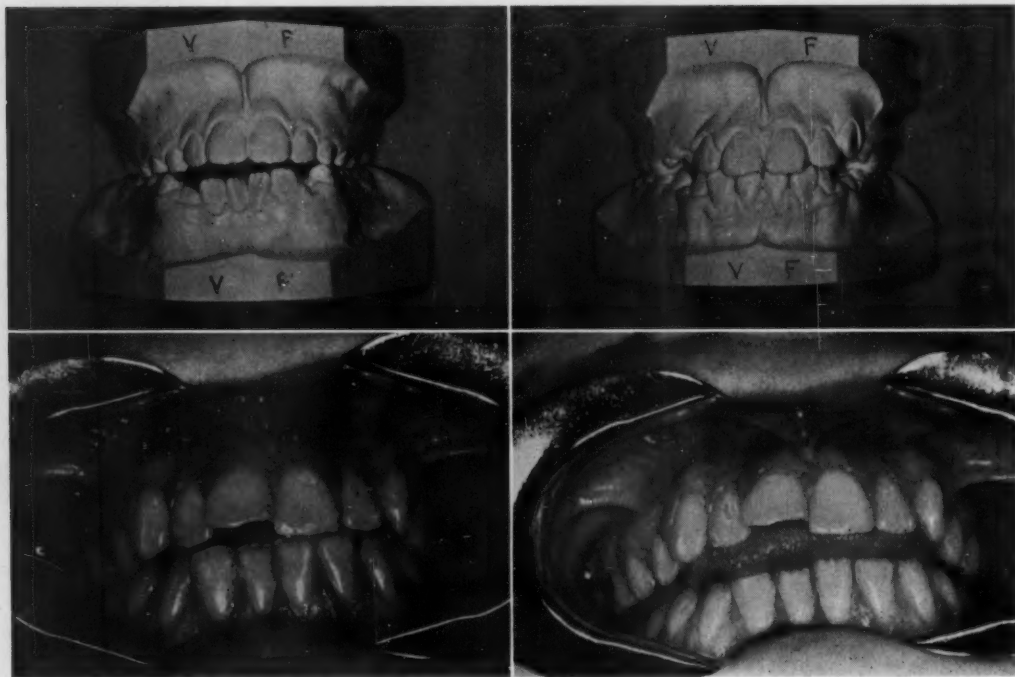


Fig. 35. Patient V. F. Tongue habit caused relapse of malocclusion which had been successfully treated in mixed dentition.

and habit therapy was instituted in its place! Rarely do mechanical gadgets or cribs correct a problem involving the twenty muscles used in normal deglutition. The proper muscles have to be retrained to swallow correctly, and I have seldom seen this done successfully by mechanical means alone.

Dentists are also interested in these abnormal swallowing habits because of the tendency for teeth to migrate later in life. Fig. 33 shows the case of Mrs. H. who, at the age of 42 years, was pushing all the anterior teeth forward because of an abnormal swallowing habit. Spacing was created between the upper and lower six anterior teeth; this progressive pushing of the teeth in the anterior position opened up the contacts in the posterior teeth, causing the formation of pockets and periodontal disturbances. These patients usually request their dentists to replace an inlay or an amalgam filling to restore or keep the teeth in contact so that food will be prevented from going between the teeth, and this is exactly what happened in this particular case. The patient was referred to me for habit training. The habit was corrected and all the spaces were closed with a removable appliance, as shown in Fig. 33.

The case of Patient K. L. shows exactly what happens when a severe abnormal swallowing habit forces the whole facial profile into a complete bi-maxillary protrusion (Fig. 34). Both the upper and lower teeth were pushed forward by the tongue until there was a complete forward displacement of tooth and bone.

Figs. 17 and 35 show cases that were treated beautifully by some of our finest orthodontists, only to relapse as a result of the tongue habit. If habit therapy is instituted in these cases, the orthodontist will find that the result of orthodontic treatment is more stable. Also, the patient's facial appearance is greatly improved, since the orbicularis is at complete rest in normal deglutition and the mentalis muscle is not used to shove the lower lip into a forward and upward position.

When the child has two habits, such as thumb-sucking and abnormal swallowing, the thumb-sucking habit should be corrected first. The lessons and methods used to correct the abnormal swallowing habit and thumb-sucking will be explained in a forthcoming article.

My appreciation to my associate, Dr. R. B. Croft, for the cephalometric drawings used in this article.

REFERENCE

1. Straub, Walter J.: Malfunction of the Tongue. Part I, *AM. J. ORTHODONTICS* 46: 404-424, 1960.
No. 2, *El Cerrito*.

AMERICAN ASSOCIATION OF ORTHODONTISTS

Presentation of the Albert H. Ketcham Memorial Award to William B. Downs by Wendell L. Wylie, president of the American Board of Orthodontics

OVER the past quarter-century the American Association of Orthodontists has bestowed the Ketcham Award upon twenty-four persons who have made distinguished contributions to our specialty. As orthodontists with varying backgrounds and differing points of view gather in this room, the drama of the occasion is sensed by everyone. It is heightened this year by three factors: (1) we are meeting in the city where Albert Ketcham established his towering reputation; (2) this year's president of our Association began his orthodontic career as an associate of Dr. Ketcham; and (3) it was here that Dr. Ketcham and his colleagues founded the American Board of Orthodontics.

The specifications for a first-class professional man are by no means lenient. They demand, first of all, that he acquire the knowledge and skills pertinent to his chosen field. In the process, he must gain a concept of what constitutes the ultimate in performance. Finally, he must acquire a capacity for growing along with the profession.

Dr. Downs has not only done these things himself but, by teaching and by precept, has also enabled countless others to do the same.

A good many who studied orthodontics at the University of Illinois remember him as the one who first showed them how metal could be shaped faithfully to the contours of the teeth and how wire could be manipulated to achieve arch form and occlusion. While he expected high standards of performance, he got them not by browbeating but by gentle encouragement.

In later years, inspired and stimulated by close association with men who were using cephalometric roentgenography as a research tool, he became intrigued with a method which promised clinical insights never before possible. As a result of the many hours he spent over a tracing table, his circle of students widened greatly. Perhaps it is true that his most fortunate students were those who worked with him firsthand. Nevertheless, there are many in the world

today who have never met Dr. Downs but have, through reading his published works, enhanced their understanding of facial development—its infinite variety, the changes wrought therein by maturation, and the potentialities for change through orthodontic treatment.

These substantial contributions to orthodontics have come not merely from dexterity and a capacity for hard work. Integrity has played the larger role. Dr. Downs has always been too honest to resort to oversimplifications, and his concepts have been tested and retested before dissemination.

In recognition of his many years as a teacher of orthodontics, of his contributions to the orthodontic literature, and of his qualities of personal leadership, it is our privilege today to confer upon Dr. William B. Downs the Albert H. Ketcham Memorial Award for 1961.

Response by William B. Downs to presentation of the Albert H. Ketcham Memorial Award

A YEAR AGO I received the greatest surprise of my dental career when the secretary of the American Board of Orthodontics informed me that my colleagues had selected me as the recipient of the Ketcham Award.

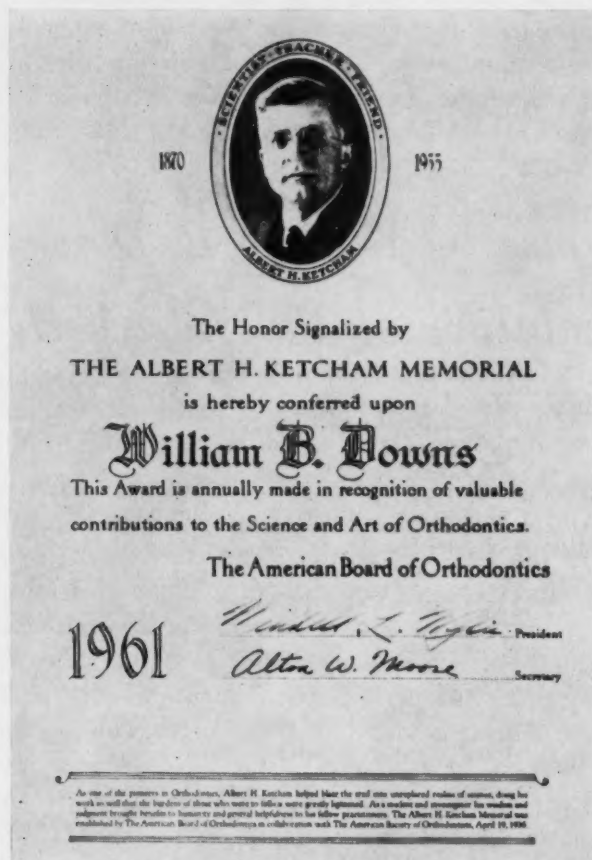
Realizing that the status of present-day orthodontics represents the efforts and thinking of many men, a review of noteworthy contributions of the last fifty years and those persons responsible for them began to take shape in my mind. Obviously, time will permit me to mention only a few. Many names and important events must be omitted. Those of us who have attempted during our professional careers to add our bit to the advancement of orthodontics realize that we leave much for the coming generations to investigate and to improve.

Fate dictated early in my career the group with which I was to be most closely associated. F. B. Noyes, former dean of the College of Dentistry of the University of Illinois, deserves first mention because of his farsighted thinking in transferring the Angle School concept of orthodontic education to a department with graduate status. This plan of specialized training has become the pattern of practically all university orthodontic education since that time.

Dean Noyes chose Allan G. Brodie to head this department. Dr. Brodie soon became internationally known as a leader in orthodontic education. A research thesis initiated with this course has become a requirement for a graduate degree. This educational pattern has been closely followed by many other schools and has played an important role in the progress of biologic thinking in orthodontics. Such training has been responsible for the number of men who have become teachers, many of whom have gone on to become department heads. The rapid

progress of present research efforts is obvious in the volume of our current literature. I believe that the time has come for a new type of magazine, more complete in its coverage.

During my service on the Illinois staff, discussion of Angle's line of occlusion, "a line with which, in form and position according to type, the teeth must be in harmony if in normal occlusion," was a routine exercise for the students who were required to submit a written explanation of the "line of occlusion."



The Albert H. Ketcham Memorial Award presented to William B. Downs.

The papers were usually incomplete, uncertain, and often confused. It was obvious that the principles of occlusion and of growth and development, factors in an interpretation of the line of occlusion, were not well understood. The need for better education and a clearer understanding of the line of occlusion remains our No. 1 problem in orthodontics.

The No. 2 problem is the need for a better understanding of the pattern of the dentofacial complex and its changes during maturation. The development of the cephalometric technique by Broadbent and Hofrath is the most significant contribution to orthodontics since the work of Angle. It has provided a means of accurate measurement and thus has led to a better understanding of case analysis and treatment planning. In his monograph entitled "The Apical Base,"

Lundström gave much assistance toward solving the problem with his detailed explanation of the relationship of the denture to its supporting bases. It suggested the inability of some dentures to contain a full complement of teeth.

Credit for modifying techniques to carry out the philosophy associated with extraction goes to Tweed, who was discouraged and dissatisfied with the clinical results being obtained and shown during the early years of his practice. These



Dr. William B. Downs, recipient of the 1961 Ketcham Award.

clinical results had evolved from the functional theory that occlusion, when the teeth were placed in normal inclined relationships, would improve through functional stimulation. Tweed, unable to produce such results in many cases or to find others who could consistently produce and maintain satisfactory results, reintroduced the principle of extraction. This has partially restored the orthodontic thinking of the days of Angle and his contemporary, Calvin Case.

For the last twenty years there has been a steady improvement in treatment results. This change has come from improved techniques and from research, much of it in cephalometries.

To summarize, the factors which have influenced my orthodontic thinking and are undoubtedly responsible for my being given this Award are as follows:

1. The development of graduate education
2. Cephalometries and its impact upon the analysis of the pattern of the dentofacial complex and treatment planning

3. Development of modified techniques for improving treatment results

Having been a teacher for thirty years, I would be remiss if I did not pay tribute to the many students who have furnished so much stimulation.

I am grateful for the opportunity of sharing with others in their efforts to advance orthodontics, and I sincerely appreciate the honor which you have bestowed upon me.

Orthodontists visit United States Air Force Academy

ONE of the themes of the Denver meeting of the American Association of Orthodontists was "Western hospitality." This theme was carried out in both dress and action.

H. C. Pollock, Jr., chairman of the Hospitality, Information, and Tours Committee, gives J. Lyndon Carman, Major Gordon Culver (Special Assistant to the Air Force Academy Superintendent), and George C. Moore credit for making arrangements for our tour of the United States Air Force Academy. On Tuesday afternoon, April 18, under perfect weather for such an event, nineteen buses took 600 members, wives, and guests from the Denver-Hilton Hotel to the Academy. The Denver Bus Company deserves a vote of thanks for their fine service.

After entering the Academy grounds, which occupy approximately 17,500 acres in the foothills of the Rampart Range, the buses stopped at an area overlooking the athletic fields and maneuver area. There we were met by escorts who took us to the planetarium and then to the academic area.

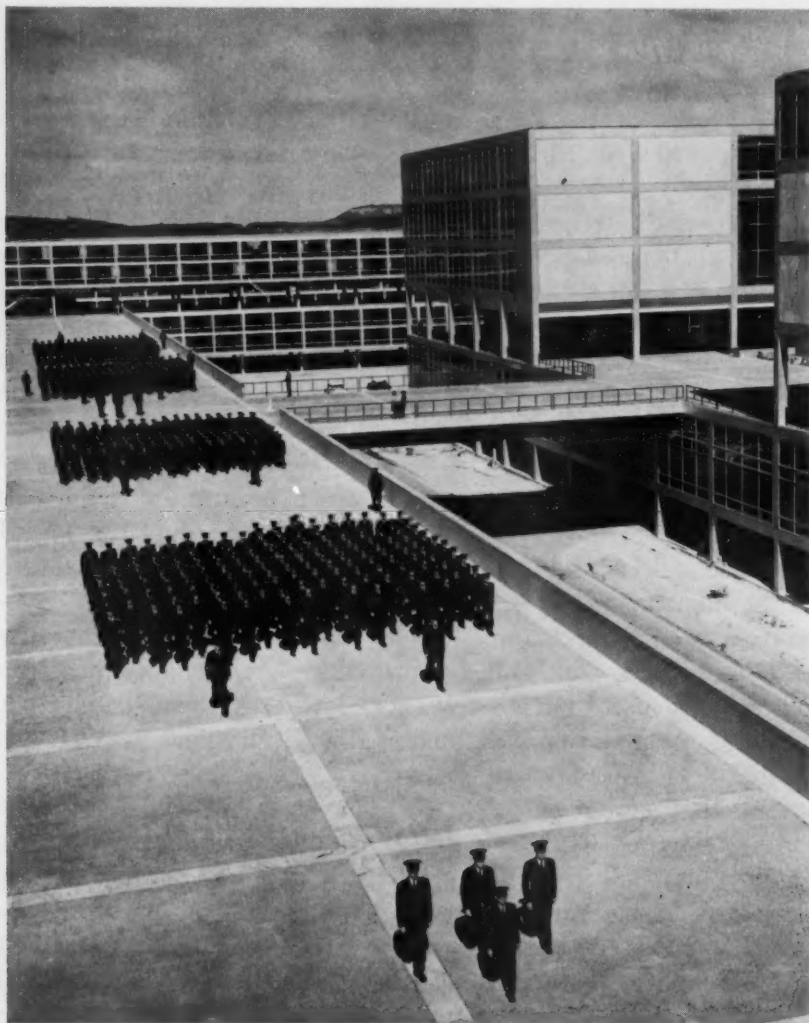
We were allowed to stretch our legs by walking up a few flights of stairs to the Cadet Dining Hall. Our group appeared rather small in that tremendous hall, which accommodates 3,000 persons. Lieutenant Colonel Morris McNabb, officer in charge of the dining hall, answered such questions as, "How can they feed so many at one time?"

The group then moved on to the theater, where we met our gracious host, Major Emil J. Martina, Office of Special Assistant to the Superintendent, and his assistants. We were given the privilege of seeing a motion picture which showed the selection of future officers and the early training at the Academy. We learned that "The mission of the Air Force Academy is to provide instruction, experience, and motivation to each cadet so that he will graduate with the knowledge and the qualities of leadership required of an officer in the United States Air Force, and with a basis for continued development throughout a lifetime of service to his country, leading to readiness for responsibility as a future air commander."

To be eligible for training at the Academy, a candidate must be male, at least 17 and less than 22 years of age, and 5 feet 4 inches but not more than 6 feet 4 inches tall. He must be a citizen of the United States, unmarried, and of good moral character. To fill most of the annual vacancies, each Senator and Representative is allowed to nominate qualified candidates.

After leaving the theater, several of our group braved a few more steps to see the 250,000 volume library, while others took the easy way out through the dental dispensary.

From the academic area, we boarded buses. Forty-two members of the group returned to Denver, and 126 went to the beautiful Broadmoor Hotel for dinner and a tour of Colorado Springs. The 432 persons who remained at the



Cadets at the United States Air Force Academy, Colorado Springs, Colorado.

Academy viewed the cadet chapel, the administration building, the cadet social center, family housing for officers, the community center, the golf course, and the site of the new athletic stadium. Then we went to the Academy Officers' Club, where it was obvious that Lieutenant Colonel Irvin L. Ungerleider, Officers' Club secretary, had overlooked nothing in preparing for our comfort. These preparations included refreshments, a delicious smorgasbord dinner, and

entertainment by Duke Melody. We were pleased to meet Captain William Paterson and to hear about his role as an orthodontist at the Academy.

After viewing the \$150,000,000.00 institution which houses the world's finest service schools, the group returned to Denver with a feeling of pride in the Academy and gratitude to the committee and hosts who made this wonderful experience possible.

Leo B. Lundergan.

President's page

THE organizational activities of the American Association of Orthodontists have grown to such an extent that the annual meeting of the Board of Directors of our Association, heretofore held on the Sunday before the annual sessions, is no longer sufficient to handle the increased number of items included on our agenda. At the Denver meeting it was found necessary to hold additional sessions of the Board on Saturday prior to the meeting.

This year the interim meeting of the Board of Directors will be held in Philadelphia on October 13 and 14, just prior to the annual meeting of the American Dental Association. Among the many topics to be studied and acted upon are (1) engaging of an administrative secretary for our Association; (2) orthodontic education; (3) membership qualifications; (4) relations with the dental profession in general; (5) orthodontic public relations; (6) short-term orthodontic technique courses; (7) group insurance for our members; (8) collection of data for a history of the American Association of Orthodontists; and (9) a study of the changing requirements of the Association's organizational structure.

After years of effort and study, orthodontic therapy is emerging from the woods of empiricism. Because of the present public demand for the service, however, there exists a serious problem—the operator who is untrained in orthodontics.

We should make certain that the dental profession as a whole understands the many serious difficulties inherent in orthodontic therapy. The orthodontic specialist, deeply engrossed in his own therapeutic problems, frequently has failed to consider his great obligation to dentistry as a whole. Undesirable attitudes toward orthodontics and orthodontists on the part of general practitioners have remained unchecked. Such attitudes among the dentists are fostered by an almost universal readiness to consider orthodontic treatment a simple mechanical procedure. We have failed to acquaint the rest of the dental profession with factual information which would enable all dentists better to evaluate the problems incident to corrections of dentofacial anomalies.

Dental educational institutions require ever greater capabilities from their students. The public is learning to appreciate dentistry as an essential health service. Dentists recognize orthodontics as a valuable dental health measure. Periodontists now term orthodontics "preventive periodontics" and engage more and more in certain phases of orthodontic therapy.

The pedodontists and dentists devoting particular attention to children's dentistry have, as a group, become impressed with the importance of so-called "interceptive orthodontics." A similar increasing interest in orthodontic treatment has become widespread among the general practitioners of dentistry. The result may be seen in the rapid increase in the number of commercial laboratories which design and fabricate appliances for any set of models presented to them. The laboratories do not create this interest; they enter into this commercial operation as a result of the demand for their product. However, dentists who have had only the most cursory undergraduate training in orthodontics do not realize the difficult therapeutic problem that they face.

Orthodontic specialists complain about such unqualified operators treating orthodontic anomalies. Have we done as much as we should to inform the dental profession of the dangers? Consider the natural attitude of the general dentist. He received very little orthodontic education in school. To the best of his knowledge, orthodontics is a relatively simple matter of applying mechanical forces to teeth. Possibly he has taken one or more short courses in appliance technique. He believes that he can perform a beneficial service for his patient. He probably feels that he can do it for a smaller fee than would be charged by the specialist. Thus, he undertakes treatment of a case, and sooner or later he experiences difficulty. The next step is to join with other beginners in one of the orthodontic societies or academies for the part-time orthodontist. This process leads to widespread unqualified orthodontic service to the public.

What is the solution? Education! It is essential that the dental schools of the nation teach the undergraduates more of the orthodontically slanted biologic sciences stressing particularly the hazards so prevalent in unskilled orthodontic therapy. It is not that we wish to train every dentist as an orthodontist; rather, it is desirable that every dentist realize the complexities of orthodontic therapy and the need for much additional education and clinical training before one is able to deliver competent orthodontic therapy.

It is very important that the dental profession be convinced that we regard ourselves as *dentists* who specialize in orthodontics and that we are primarily interested in the dental welfare of the patient.

Our members should participate in dental society meetings as dentists on programs designed to point out the need for skill and knowledge to avoid hazards and failures in orthodontic treatment. Knowledge of the rigid clinical requirements that we place upon ourselves should be disseminated. Sectional societies should form committees to study methods of meeting this need for special training. They should invite interested dentists to attend those meetings at which the program has been especially designed to present orthodontic treatment problems.

If an ineffective, traumatizing type of orthodontic therapy is practiced widely by dentists, the public relations of dentistry will suffer from the resulting failures. However, the orthodontic specialist will receive the principal public resentment, since the public generally does not differentiate between the trained orthodontist and the dentist who is not trained to give this specialized treatment.

Dallas R. McCauley.

EDITORIALS

The new look

THE FIRST issue of our JOURNAL, originally known as the INTERNATIONAL JOURNAL OF ORTHODONTIA, was published in January, 1915. World War I was raging at the time, and interest in all departments of both medicine and dentistry was at a high pitch. With its simple format and light gray cover, the JOURNAL had a dignified appearance in the tradition of the top professional publications of the day, and it served with dignity for close to half a century with no important changes being made in its physical appearance.

Last month, after some very careful planning by the Editorial Board and by the Production and Editorial Departments of The C. V. Mosby Company, the AMERICAN JOURNAL OF ORTHODONTICS appeared in new raiment. The modernized format employs the basic principle that good graphic design serves ease of readership; time-tested type faces which are legible and attractive have been selected; and the familiar gray cover has given way to a new cover of white coated stock with a dash of red. The result is an up-to-date appearance of genuine quality.

One feature of interest to most readers is the new method of binding, which has been in use since July, 1960. This new method, known as "adhesive binding," permits the publication to lie flat while retaining its shape and strength. Also, readers can easily remove pages of an article for filing without slitting the JOURNAL.

The advent of the "new look" in the July issue inspired us to turn back to volume 1, number 1, of the JOURNAL that appeared in January, 1915. In that first issue an editorial by the late Martin Dewey (the first editor) proclaimed the editorial policy as follows:

In assuming the editorship of the International Journal of Orthodontia, I fully realize the responsibilities. The success of this undertaking will depend upon the ability of the publishers to produce a high-class journal and give it wide circulation, and upon the editor and his staff to secure for publication each month meritorious contributions on timely subjects of interest to those engaged in the practice of orthodontia, dentistry and its allied specialties.

Of course, our readers and contributors will be interested in knowing something of our policy. Briefly, we want to state that the Journal will be conducted for the benefit of orthodontia as a science and as a specialty. To this end we will strive to publish articles that will be of interest to the entire orthodontic fraternity. We will endeavor to secure contributions of merit from workers in the field of orthodontia and its closely allied specialties, regardless of "race, color, or previous conditions of servitude."

It is our intention when publishing articles dealing with appliances and methods of treatment to describe only such appliances and those forms of treatment that have proven their worth in the hands of responsible practitioners.

On account of the diversity of opinion with reference to "nomenclature," articles will be published with whatever form of nomenclature the writer desires to use, but such use does not imply that the editor agrees with the views of the author.

The pages of the Journal will always be open for the discussion, in a scientific manner, of disputed points in orthodontia.

It shall be our constant endeavor to secure original contributions on subjects of interest to our readers and the proceedings of those societies that in our opinion can best be served by publication in this Journal.

We hope through this policy to serve at all times the greatest number and to help make orthodontia the science we have long hoped it would be.

Another editorial in the same issue described the opinion of the eminent Charles H. Mayo as follows:

Dr. Mayo believes that the day is not far distant when orthodontia will become one of the most important specialties of either medicine or dentistry. He looks for great advancement of this science, as a result of which child-life is going to be much benefited.

The AMERICAN JOURNAL OF ORTHODONTICS, with its "new look" and its long record of orthodontic progress, is one indication that Dr. Mayo's prediction is coming true.

H. C. P.

Cephalometrics is work in progress

WHEN the practice of haphazardly pushing "crooked teeth" about was found wanting, orthodontists turned to anthropometry and eventually to radiographic cephalometrics. Cephalometrics is not a passing fad. Present-day methods of practice make it mandatory for the clinical orthodontist to know and understand quantitative changes in growth and development. The orthodontist must avail himself of cephalometric methods as an aid in describing, classifying, and planning treatment for the correction of malocclusions and the elimination of dentofacial malformations and in estimating the degree of corrective results to be obtained.

The use of cephalometric methods in orthodontic therapy is not synonymous with an understanding of the growth and development of the face and the underlying bony skeleton. It must be recognized, however, that many of the lines, planes, and angles usually employed in cephalometrics are influenced by growth and developmental changes of the individual bones which make up the facial skeleton. These bones, in their respective courses of development, may become smaller, grow in size, or be bodily translated in space in relation to the other facial components. Before we can understand the significance of growth as portrayed by any of the cephalometric systems of dentofacial analysis, we must first understand the developmental behavior of the individual bones.

The reason that practicing orthodontists so enthusiastically accepted radiographic cephalometry is self-evident. The practicing orthodontist, whether he will

admit it or not, is essentially a technician. This is not said with any intention to belittle him, for technicians are very important in our civilization. They are the ones who do things. The technician's frame of reference is based on a perceptual philosophy. That explains why practicing orthodontists readily accepted cephalometrics without questioning the validity of the parameters handed down to them by other orthodontists engaged in cephalometric research. Cephalometry was something that permitted practicing orthodontists to see, measure, and count.

Science, in its broad aspects, today follows a conceptual philosophy. The laws of cause and effect are no longer considered immutable, certainly not since the acceptance of Einstein's quantum theory of relativity. The entire structure of atomic physics is based on a conceptual philosophy.

Clinical orthodontists must, of necessity, favor a perceptual philosophy. Like all technicians who work according to given formulas or rules, they have not considered fully the fact that parameters based on different groups of children cannot be applied with a high degree of exactness to any one child in particular, the exact likeness of whom never existed before and will never exist again.

While the measurement of man is possible, the basic principles involved need further and more detailed discussion, testing, and definition. The areas with which we are concerned need to be classified from the standpoint of their relative stability and importance.

Standard deviations in cephalometrics have a wide range, and there is too much subjectivity in our interpretation of these standards.

As Moss* pointed out, to give but one example, nasion is not part of the cranial base. Still, orthodontists use it in constructing a prime line in the base of the cranium. Growth potential cannot be predicted from a single radiogram. Knowledge must emanate from embryology, phylogenetics, comparative developmental anatomy, genetics and ontogenetics and, above all, physiology. Otherwise, our measurements can prove functionally meaningless in clinical practice.

In radiographic cephalometrics we must strive to obtain multivariate analyses of numerical expressions based on the morphologic integration of the human skull. In this way we may make valid conclusions from the measurement of the covariants which are peculiar to all biologic entities, especially the human skull.

When orthodontists speak about growth of the face according to cephalometric findings, they are referring essentially to the results of the changes which have taken place during the growth experience of the individual. These cannot exactly be determined as coming from maturative growth or orthodontic therapy until we learn a great deal more about growth of the individual components, extrinsic and intrinsic, and the factors and time gradients which bring about such growth.

*Moss, M. L.: Transactions of Research Workshop on Roentgenographic Cephalometrics. (To be published by J. B. Lippincott Company, Philadelphia.)

Standards in radiographic cephalometrics have been adopted according to their conformity with clinical application. None have ever been confirmed by experimental analysis. This has led to variations in interpretation of cephalometrics, based largely on subjective needs. As yet there is no correlation of statistical measurements to biologic significance based on valid experimentation.

Cephalometrics has to establish a basic concept for its findings. As Sherrington* puts it, we are looking for "a likelihood grounded in fact and established by reason." It will not help the orthodontist to lull himself into a sense of security by contending that these "work" in practice when the inadequacies of the analytic "systems" which he currently employs are pointed out to him. Until multivariate analyses reach some definitive state, the term *morphologic growth pattern* will remain an empiric expression, be it used in reference to growth study, growth prediction, or clinical application. Cocksure ignorance based on subjectivity must give way to scientific objectivity.

J. A. S.

*Sherrington, Sir Charles: *Life's Unfolding*, London, Walls and Co., p. 86.

DEPARTMENT OF ABSTRACTS AND REVIEWS

Edited by DR. J. A. SALZMANN, *New York City*

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmnn, 654 Madison Avenue, New York City.

A Longitudinal Study of Growth in Face Depth During Childhood

By Howard V. Meredith, Am. J. Phys. Anthropol. 17: 125-135, June, 1959.

The data are drawn from lateral roentgenograms of 125 white children examined annually between the ages of 5 years and 11 years.

The anteroposterior facial dimension selected may be identified tentatively as the rectilinear distance from the most forward point on the anterior nasal spine to a point near basion.

The subjects were sixty boys and sixty-five girls residing in or near Iowa City, Iowa. They constituted a group of American-born white children predominantly of northwest European ancestry and above average socioeconomic status. Approximately 50 per cent of their fathers held professional or major managerial positions; 40 per cent owned small businesses, followed skilled trades, or engaged in commercial occupations; and 10 per cent were semiskilled employees.

The child's head was positioned in a cephalostat. The x-ray source was to the right of the child at a distance of 150 cm. from the median plane of the cephalostat, the cassette was near the left side of the child's head, and the central ray passed through the child's external acoustic meatuses perpendicular to the sagittal plane and the plane of the film.

Two landmarks were defined as (1) the most forward point on the radiographic image of the anterior nasal spine and (2) the most forward point on the radiographic image of the occipital condyles. Under conditions of symmetrical development of the condyles and correct subject orientation for a lateral roentgenogram, the posterior landmark may be described as the site of the junction of the anterior margin of the right occipital condyle with the precondylar portion of the occipital bone. Adequate representation of the tip of the anterior nasal spine was provided for by use of an aluminum wedge at the time of film exposure.

In order to minimize age-to-age variation in landmark determination, a landmark was registered at a single sitting on the entire series of roentgenograms for a subject. This was done with the aid of an illuminated worktable and a magnifying glass, each roentgenogram being pricked with a fine-pointed probe.

Each radiogram was measured by two anthropometrists working independently.

Each obtained value was corrected for radiographic enlargement. The adjusted values represent skeletal face depth defined as the minimum distance from the tip of the anterior nasal spine to the anteriormost point of the occipital condyles. The latter point was used because basion cannot be identified on the lateral roentgenogram.

SUMMARY

Skeletal face depth was investigated with respect to size and change during the second six years of human ontogeny. Absolute magnitude data were analyzed longitudinally for trend and cross-sectionally for variability. Absolute and relative increments were used to study velocity differences and associations with changes in other measurements of the face. Highly valid measures of face depth in all children were supplemented with increment data on bizygomatic face breadth and skeletal nose height for the same children.

The following findings are reported: (1) The trend of means for face depth in childhood is a negatively accelerated, increasing function of age; (2) at each age studied the average face depth is approximately 3 per cent larger in boys than in girls; (3) both absolute and relative variability of face depth increase with age; (4) approximately 90 per cent of individual magnitude trends for face depth rise concavely to the time base line; (5) increases in face depth during childhood are more than 100 per cent larger in some persons than in others; (6) the association between rates of growth in face depth from 5 to 8 years of age and from 8 to 11 years of age approximates $r = 0.50$; (7) relationships among absolute increments for face depth, face breadth, and nose height lie between zero and $r = 0.40$; and (8) concomitant variation among relative growth rates is no higher than among absolute growth rates.

NEWS AND NOTES

American Association of Orthodontists

Orthodontists are reminded that it is not too early to start planning to attend next year's A. A. O. meeting, which will be held in Los Angeles, California, April 28 to May 3, 1962.

American Board of Orthodontics

At its April, 1961, meeting in Denver, the American Board of Orthodontics decided that each year a current copy of the American Board booklet should be sent to all Diplomates.



The famous Hollywood Freeway, a nonstop highway which takes the motorist scooting above the housetops and alongside the upper stories of buildings, from downtown Los Angeles to Hollywood, with its movie, radio, and television studios, in little more than ten minutes. This photograph shows the Freeway as seen from the Hollywood Hills at the north side of the glamour town, looking toward Los Angeles.

Great Lakes Society of Orthodontists

It has become necessary to change the dates of the annual meeting of the Great Lakes Society. The meeting will be held Nov. 26 to Dec. 1, 1961, at the Eden Roc Hotel in Miami Beach, Florida.

The following papers will be presented:

- Radiographic Interpretation of Temporomandibular Joint Disturbances. William Updegrave, Philadelphia, Pennsylvania.
- Diagnostic Procedures for Disorders of the Temporomandibular Joint. Laszlo Schwartz, New York, New York.
- Harmonious and Disharmonious Functions of the Temporomandibular Joint's Musculature and Occlusion. John R. Thompson, Chicago, Illinois.
- Techniques for Radiographic Surveys of the Temporomandibular Joint. William Updegrave, Philadelphia, Pennsylvania. (Dr. Updegrave will supplement his paper with a table clinic.)
- Methods of Treatment of Disorders of the Temporomandibular Joint. Laszlo Schwartz, New York, New York.
- The Interrelations of Facial Pattern, Facial Growth, and Function. John R. Thompson, Chicago, Illinois.
- Mandibular Osteotomy and Osteotomy. Robert Ponitz, Ann Arbor, Michigan.
- Light Wire and Light Forces. Parts I and II. Charles Burstone, Indianapolis, Indiana. (Dr. Burstone will supplement his paper with a table clinic.)
- Treatment in the Mixed Dentition. Charles Tweed, Tucson, Arizona.
- Treatment in the Adult Dentition. Charles Tweed, Tucson, Arizona.
- Cephalometric Analysis for Comprehensive Diagnosis and Special Treatment. Scott Holmes, Muskegon, Michigan.

Other highlights of the meeting will be the presentation of American Board case reports, a symposium by Drs. Updegrave, Schwartz, and Thompson, table clinics, a review of institutional research from 1954 to 1960 by Ben Williams of Columbus, Ohio, business sessions, and installation of new officers.

Social activities will include special luncheons, a fashion show for the ladies, two night club tours, and the president's reception and banquet.

Middle Atlantic Society of Orthodontists

The next meeting of the Middle Atlantic Society of Orthodontists will be held Oct. 1 to 3, 1961, at the Chalfonte-Haddon Hall Hotel in Atlantic City, New Jersey.

Excerpts from the Bulletin of the Pacific Coast Society of Orthodontists

BOW DOWN TO WASHINGTON

The American Board of Orthodontics selected as the best thesis submitted for Board examination in 1960 the one written by our good friend from Spokane, Washington, Malcolm R. Chipman. "Chip" read his paper, entitled "Second and Third Molars: Their Role in Orthodontic Therapy," at the fifty-seventh annual meeting of the American Association of Orthodontists, which was held April 16 to 20, 1961, in Denver, Colorado. This is the fourth time in the last five years that a member of the Northwest Component residing in Washington has been named as the author of the best American Board thesis or has won the Hellman Award. We extend our congratulations and best wishes to "Chip" Chipman, and we are truly "bowing down to Washington."

NEW MEMBER OF AMERICAN BOARD OF ORTHODONTICS

Richard M. Railsback of Piedmont, California, was selected to be the new member of the American Board of Orthodontics by the directors of the American Association of Orthodontists at the meeting in Denver. Dr. Railsback will replace Wendell Wylie who served as president of the Board for the last year. Congratulations to Dick for receiving this appointment; we are certain that he will carry on the fine work that the Board has been doing. Wendell served for six important years of Board activity, and his fine efforts are appreciated by those who have been close to this hard-working group.

RESOLUTION PASSED AT AMERICAN ASSOCIATION OF ORTHODONTISTS MEETING

Resolved that the American Association of Orthodontists looks with disfavor on any of its members participating in conducting any short course in orthodontics unless said course is under the jurisdiction of a university or unless it has been specifically approved or sponsored by a sectional society.

In order to achieve proper effectiveness from this statement of policy, each of the individual constituent societies of the A. A. O. should establish the proper committee structure to service requests for approval of orthodontic courses. The Southern Component of the Pacific Coast Society of Orthodontics had such a potential educational advisory committee last year.

NORTHERN COMPONENT

The regular meeting of the Northern Component, P.C.S.O., was held Feb. 26 and 27, 1961, at the Ben Franklin Hotel in Seattle, Washington. A cocktail hour and a fine dinner were well attended on Sunday evening.

Chairman Robert Kemp called the meeting to order on Monday morning. The morning session was turned over to the program chairman, Ralph Cooper. Dr. Cooper introduced the main speaker for the day, Dr. Robert Harrington from Hollywood, California, a speech therapist, who gave a very informative talk concerning tongue habits. The role of the speech therapist in treatment of such problem cases was discussed. Dr. Harrington made the point that he felt that teaching a patient to swallow properly was only half the problem. He felt that the patient should have speech training to finish the treatment. The afternoon session consisted of a panel discussion and a question-and-answer period, with Dr. Harrington, Dr. John Palmer (University of Washington speech therapist), and Mrs. Helen Carrell (speech therapist with the Seattle schools) on the panel. If the number of questions was any indication, the program was a great success.

CENTRAL COMPONENT

The first meeting of the year was held at the Fairmont Hotel on Feb. 21, 1961. A fine attendance by the membership indicated their intense interest in the subjects discussed by four eminent speakers. The theme of the meeting was "Solvency or Social Security," or how we, as individuals, can best retain a portion of our earnings, invest these earnings, and minimize taxes on our estates.

SOUTHERN COMPONENT

The first joint meeting of the Southern Component of the P.C.S.O. and the Southern California Society of Dentistry for Children was held at the Statler-Hilton Hotel in Los Angeles on March 10, 1961.

The morning session was devoted to a discussion of the relationship of orthodontics and pedodontics, in which Clinton C. Emmerson represented the pedodontists and Dallas R. McCauley represented the orthodontists. After Drs. Emmerson and McCauley had spoken,

the meeting was opened for discussion from the floor. Those participating were Val Clark, Robert Gawley, Paul Husted, Robert Ruhe, Harry Dougherty, Mode Perry, Ray Kreizinger, Lee Logan, and Harvey Spears.

The afternoon speaker was Joseph Schurter, who discussed "Tongue and Facial Muscle Problems." Dr. Schurter used a series of case histories, slides, and motion pictures to illustrate various facial muscle habits and tongue-thrusts.

Northeastern Society of Orthodontists

The fall meeting of the Northeastern Society of Orthodontists will be held Oct. 29 to 31, 1961, at the Hotel Manger in Rochester, New York. This meeting is rather special, since it will mark the fortieth anniversary of the founding of the Northeastern Society. An appropriate banquet to celebrate this occasion has been scheduled for Monday evening, October 30, in the Grand Ballroom of the Hotel Manger.

The Executive Committee, under the capable chairmanship of Nicholas Ippolito, has prepared a very worth-while scientific program. Among those scheduled to appear as essayists, are such outstanding teachers and clinicians as Edward Martinek, Jacob Subtelny, Frank Lamons, Morris Stoner, Lawrence McKiver, David Ast, and William Biederman. In addition, the Local Arrangements Committee, under the able chairmanship of Barnett Frank, has assembled a splendid group of table clinicians who also will cover a wide range of timely subjects.

This will be the first time in the forty-year history of the Northeastern Society that it will convene in the beautiful city of Rochester. The ladies are being encouraged to attend. In addition to the fortieth anniversary dinner dance, a tour of Kodak Park has been arranged for the ladies, with a luncheon provided by Eastman Kodak Company. The Northeastern Society is also providing a hospitality room, so that the ladies may be guests of the Society at a continental breakfast. While a great deal of effort has been expended in preparing an outstanding scientific program, the social aspects of the meeting have also been given considerable attention.

During one phase of the meeting, the Rochester Dental Society is planning to honor Leuman Waugh for his outstanding contributions to our specialty. This is particularly appropriate, since Dr. Waugh spent his boyhood in Rochester and it was here that he began his career in dentistry. We in the Northeastern Society of Orthodontists feel honored that Dr. Waugh has been singled out for such recognition.

Southwestern Society of Orthodontists

The next meeting of the Southwestern Society of Orthodontists will be held at the Sheraton-Dallas Hotel in Dallas, Texas, Oct. 22 to 25, 1961.

Southern Society of Orthodontists

The next meeting of the Southern Society of Orthodontists will be held Nov. 5 to 8, 1961, in St. Petersburg, Florida. A digest of the program follows.

Sunday, November 5

Registration and recreation.

Monday, November 6

Case Analysis and Treatment Planning. William L. Wilson.

Practical Aspects of Diagnosis in Orthodontics. J. A. Salzmann.

Tooth Position—The Incidental Result of the Reflex Forces of the Dento-Oro-Facial Complex. William A. Buhner.

Functional and Appliance Dynamics in Class II Cases. William L. Wilson.

Principles in Treatment of Class II Malocclusion. J. A. Salzmann.

Tuesday, November 7

Appliance Design and Use in "Borderline Cases." William L. Wilson.

The Responsible Person. J. Wallace Hamilton.

Luncheon honoring new members. (Speaker: Dallas R. McCauley, president of the American Association of Orthodontists.)

Table Clinics (Ed Baker, Chairman).

Wednesday, November 8

What We Know and What We Do in Orthodontics. J. A. Salzmann.

Case Reports. Tyler Haynes, William Ditto, and R. B. Smythe.

Problems and Pitfalls in Orthodontics. William L. Wilson.

Question-and-Answer Period.

Lancaster Cleft Palate Clinic

Graduate trainingship grant awards through the Department of Health, Education, and Welfare, National Institute of Dental Research, are available to qualified persons in the fields of medicine, dentistry, speech, and special education.

The course, which will be given Oct. 9 to 12, 1961, deals with the habilitation/rehabilitation program of persons with oral-facial-speech handicaps.

All inquiries concerning the program should be addressed to Robert T. Millard, Program Director, Lancaster Cleft Palate Clinic, 24 N. Lime St., Lancaster, Pennsylvania.

Advisory Committee on Preventive Dentistry

Major General Joseph L. Bernier, Chief of the Army Dental Corps, has arranged for the services of a group of highly placed civilian dentists to serve on an Army Medical Service Advisory Committee on Preventive Dentistry.

General Bernier will serve as chairman. There will be four other military members and the following outstanding civilian dentists: John C. Brauer, dean of the School of Dentistry, University of North Carolina; Hamilton B. G. Robinson, dean of the School of Dentistry, University of Kansas City; Joseph C. Muhler, Professor of Basic Sciences, Indiana University; and Irving Glickman, Professor of Periodontology, Tufts University School of Dental Medicine.

It is anticipated that the Committee will meet quarterly, at the call of the chairman, to advise on ways and means of furthering the objectives of preventive dentistry.

During the first week of June the Army Dental Corps held its first course on preventive dentistry at the Walter Reed Army Institute of Research, with senior Dental Corps officers from all over the world in attendance. The basic principles of the preventive dentistry program were formalized, and implementation techniques were described. Major changes in the reporting policies, designed to place increased emphasis on prevention of dental ills, were announced.

The new Advisory Committee is drawing up plans for a totally new concept of treatment recording. The present method of charting the mouth and listing individual operations performed will be gradually phased into the new system based on the total treatment plan concept. This is expected to begin early in 1962.

In order to coordinate this new program fully, a Preventive Dentistry Division is being established within the Office of the Special Assistant for Dental Services to the Army Surgeon General. Through this mechanism, implementation advice, technical procedures, and educational data will be disseminated. Colonel Russell Sumnicht, DC, who has a degree in public health dentistry, will be brought to Washington from Brooke Army Medical Center to head the new division.

Graduate orthodontics at Baylor University College of Dentistry

The first class has been selected for graduate study in orthodontics at Baylor University College of Dentistry. Study will begin in September, 1961, and will continue for twenty-four months. Upon satisfactory completion of all requirements, including an acceptable thesis, the candidate will be awarded an M.S.D. degree from the Graduate School.

George H. Wern, B.S., D.D.S., M.S.D., Ed.D., is chairman of the Department of Graduate Orthodontics and Professor of Orthodontics. Robert E. Gaylord, D.D.S., M.S.D., is professor of Clinical Orthodontics.

A maximum of six applicants will be selected annually, to become one-half of the maximum candidate total of twelve. Further information concerning the course may be obtained from the Registrar, Baylor University College of Dentistry, 800 Hall St., Dallas 10, Texas.

Army dental chief elected to fellowship in Royal Society of Medicine

Major General Joseph L. Bernier, Chief of the Army Dental Corps, has been notified of his selection as a Fellow of the famed Royal Society of Medicine in London. This is a singular honor, since General Bernier was the only American on the list. He also was the only dental surgeon to be included in the group, which consisted of physicians from various parts of the British Empire, Egypt, Teheran, and Ireland.

Death of Brewer E. Phillips

We regret to report the recent death of Brewer E. Phillips of Salt Lake City, Utah. An obituary will appear at a later date.

Notes of Interest

Jack H. Okun, D.D.S., M.S., announces the opening of his office at 2716 South Dixie, West Palm Beach, Florida, practice limited to orthodontics.

Max Kuharich, D.D.S., M.S.D., announces the removal of his office to 6426 Northwest Highway, Chicago, Illinois, practice limited to orthodontics.

Joe M. Pike, D.D.S., announces the association of his son, John B. Pike, D.D.S., M.S.D., in the practice of orthodontics at 503 Granite Exchange Bldg., St. Cloud, Minnesota.

George P. Rejebian, D.D.S., announces the opening of his offices at 116 Murray St., Binghampton, New York, and in the State Theatre Bldg., Endicott, New York, practice limited to orthodontics.

Death of Frederick B. Noyes

We have just received word that Frederick B. Noyes of Lake Worth, Florida, died on July 24, 1961. An obituary will appear in a forthcoming issue of the JOURNAL.

Forthcoming meetings of the American Association of Orthodontists:

1962—Statler Hotel, Los Angeles, California, April 28 to May 3.

1963—Hotel Fontainebleau, Miami Beach, Florida, May 5 to 9.

1964—Palmer House, Chicago, Illinois, May 10 to 14.

1965—Dallas Statler-Hilton, Dallas, Texas, April 25 to 30.

Officers of Orthodontic Societies*

The *American Journal of ORTHODONTICS* is the official publication of the American Association of Orthodontists and its component societies. The Editorial Board of the JOURNAL is composed of a representative of each of the component societies.

American Association of Orthodontists Next meeting April 28-May 3, 1962, Los Angeles

President, Dallas R. McCauley, 410 South Beverly Dr., Beverly Hills, Calif.

President-Elect, J. A. Salzmänn, 654 Madison Ave., New York, N. Y.

Vice-President, J. Lyndon Carman, 501 Republic Bldg., Denver, Colo.

Secretary-Treasurer, Earl E. Shepard, 225 South Meramec, Clayton, Mo.

Central Section of the American Association of Orthodontists Next meeting Oct. 1-3, 1961, Minneapolis

President, Henry E. Colby, 1850 Medical Arts Bldg., Minneapolis, Minn.

Secretary-Treasurer, Kenneth E. Holland, 1016 Sharp Bldg., Lincoln, Neb.

Director, G. Hewett Williams, 811 Elm St., Winnetka, Ill.

Great Lakes Society of Orthodontists Next meeting Nov. 26-Dec. 1, 1961, Miami Beach

President, Paul V. Ponitz, 914 Security Bank Bldg., Battle Creek, Mich.

Secretary, Edward A. Cheney, 2900 Grand River, Lansing, Mich.

Director, Harlow L. Shehan, 601 Jackson City Bank Bldg., Jackson, Mich.

Middle Atlantic Society of Orthodontists Next meeting Oct. 1-3, 1961, Atlantic City

President, Paul V. Reid, 1501 Medical Arts Bldg., Philadelphia, Pa.

Secretary-Treasurer, Charles S. Jonas, Mayfair Apts., Atlantic City, N. J.

Director, Louis E. Yerkes, 825 Linden Ave., Allentown, Pa.

Northeastern Society of Orthodontists Next meeting Oct. 29-31, 1961, Rochester, N. Y.

President, Irving Grenadier, 888 Grand Concourse, New York, N. Y.

Secretary-Treasurer, David Mossberg, 36 Central Park S., New York, N. Y.

Director, Norman J. Hillyer, 230 Hilton Ave., Hempstead, L. I., N. Y.

Pacific Coast Society of Orthodontists Next meeting Aug. 6-10, 1961, Seattle

President, E. Allen Bishop, 703 Cobb Bldg., Seattle, Wash.

Secretary-Treasurer, Warren A. Kitchen, 2037 Irving St., San Francisco, Calif.

Director, William S. Smith, 2530 Bissell Ave., Richmond, Calif.

Rocky Mountain Society of Orthodontists

President, Louis J. Williams, 843 South Center St., Casper, Wyo.

Secretary-Treasurer, Hubert J. Bell, Jr., 230 Mercantile Bank Bldg., Boulder, Colo.

Director, Ernest T. Klein, 707 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists Next meeting Nov. 5-8, 1961, St. Petersburg

President, Charles E. Harrison, 362 Sixth St., S., St. Petersburg, Fla.

Secretary-Treasurer, William H. Oliver, 1915 Broadway, Nashville, Tenn.

Director, Boyd W. Tarpley, 2118 Fourteenth Ave., S., Birmingham, Ala.

Southwestern Society of Orthodontists Next meeting Oct. 22-25, 1961, Dallas

President, Bibb Ballard, 7713 Inwood Rd., Dallas, Texas

Secretary-Treasurer, Tom M. Matthews, 8215 Westchester Dr., Dallas, Texas

Director, Nathan Gaston, 701 Walnut St., Monroe, La.

American Board of Orthodontics Next meeting April 23-28, 1962, Los Angeles

President, J. A. Salzmänn, 654 Madison Ave., New York, N. Y.

Vice-President, B. F. Dewel, 708 Church St., Evanston, Ill.

Secretary, Alton W. Moore, University of Washington School of Dentistry, Seattle, Wash.

Treasurer, Paul V. Reid, 1501 Medical Arts Bldg., Philadelphia, Pa.

Director, Frank P. Bowyer, 608 Medical Arts Bldg., Knoxville, Tenn.

Director, Nathan G. Gaston, 701 Walnut St., Monroe, La.

Director, Richard M. Railsback, 1333 Grand Ave., Piedmont, Calif.

*In order to keep this list up to date, the editor depends on the various sectional editors to notify him immediately of changes in officer personnel.

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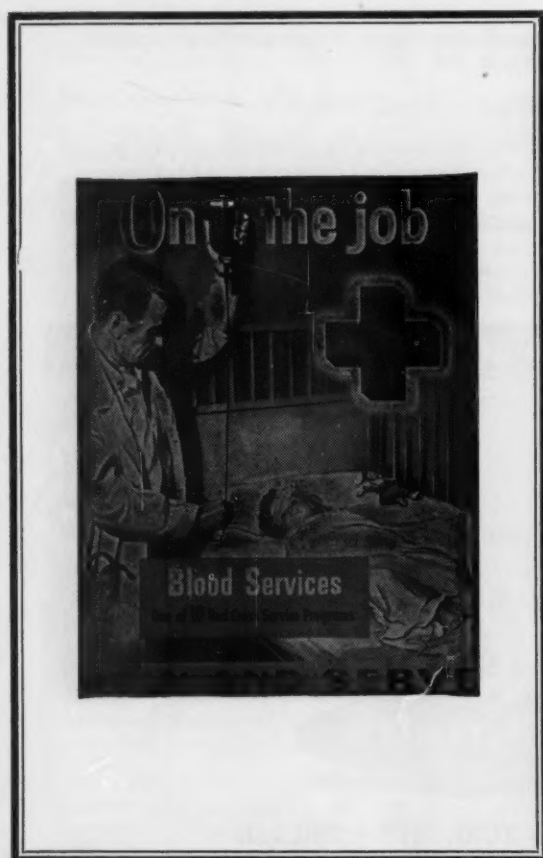
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C. Philip Adams "The Design and Construction of Removable Orthodontic Appliances." New Revised 2nd Edition. \$5.50.

P. R. Begg "Differential Force in Orthodontic Treatment." Reprint from A.J.O. July, 1956. 4 Reprints, 1954 A.J.O. All 5 Reprints. \$6.00.

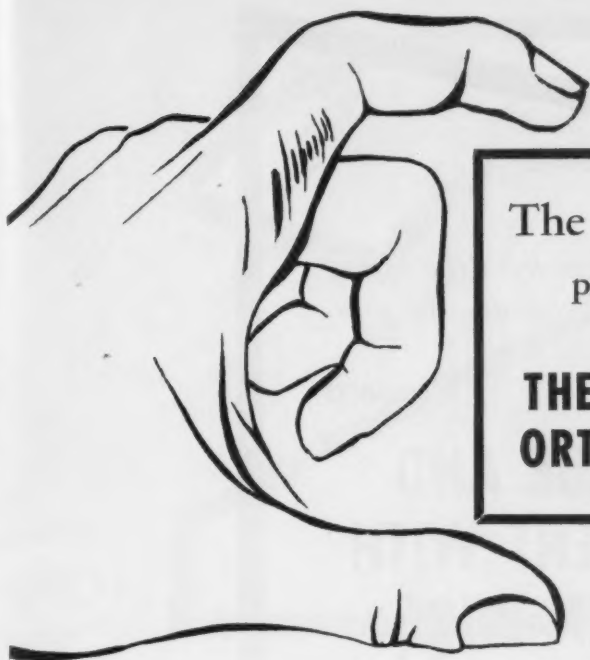
Haupl, Grossman and Clarkson "Functional Jaw Orthopedics" Translated from the German. \$9.50.

Prof. A. M. Schwarz "Rontgenostatics" Text and Figures in English. This work is the perfection of Paul Simon's revolutionary system of "Gnathostatics" \$7.00

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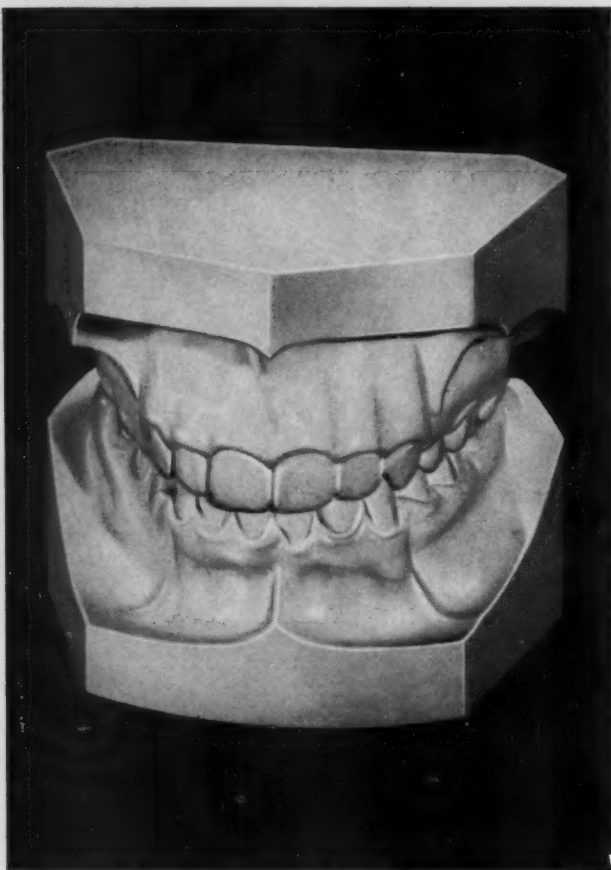
There has been a constant interest and growing demand for more information on the labiolingual technique since the first book on this subject was published 20 years ago. Many new ideas have been added to the technique during this time, although the basic principles of anchorage and appliance construction remain the same.

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Since there are many excellent texts on diagnosis available to orthodontists, no direct discussion of this subject is included in this new book; rather, diagnosis is discussed indirectly throughout the book. It is recognized that accurate treatment planning and treatment must be preceded by an adequate diagnosis.

By **BOYD W. TARPLEY, B.A., D.D.S.**, Professor and Chairman, Department of Orthodontics, University of Alabama School of Dentistry, Birmingham, Ala.

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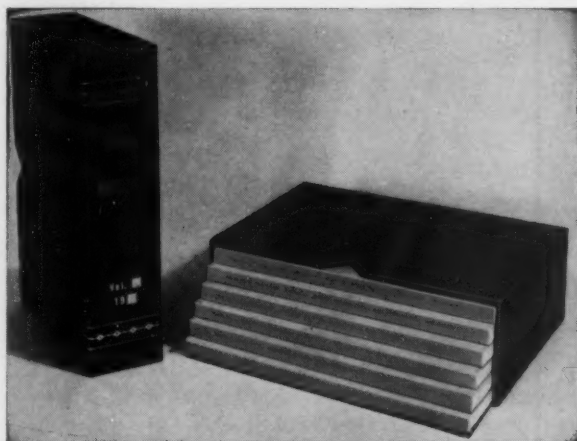
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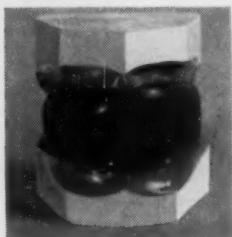
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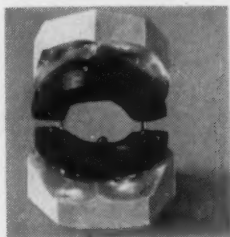
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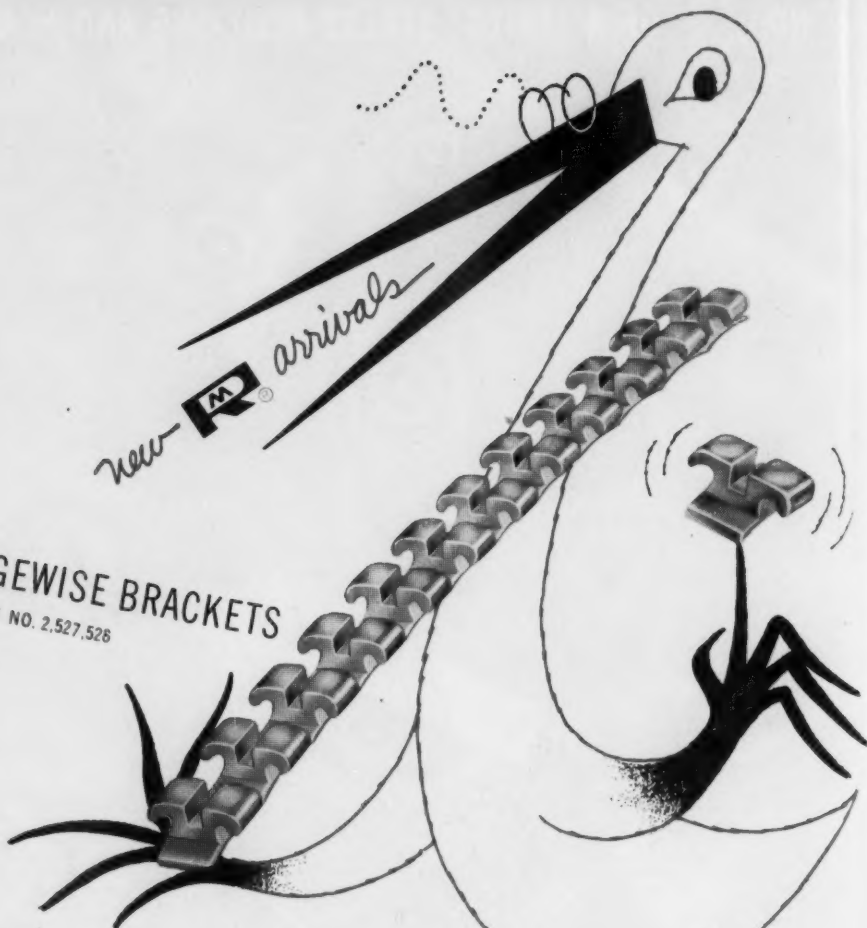
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